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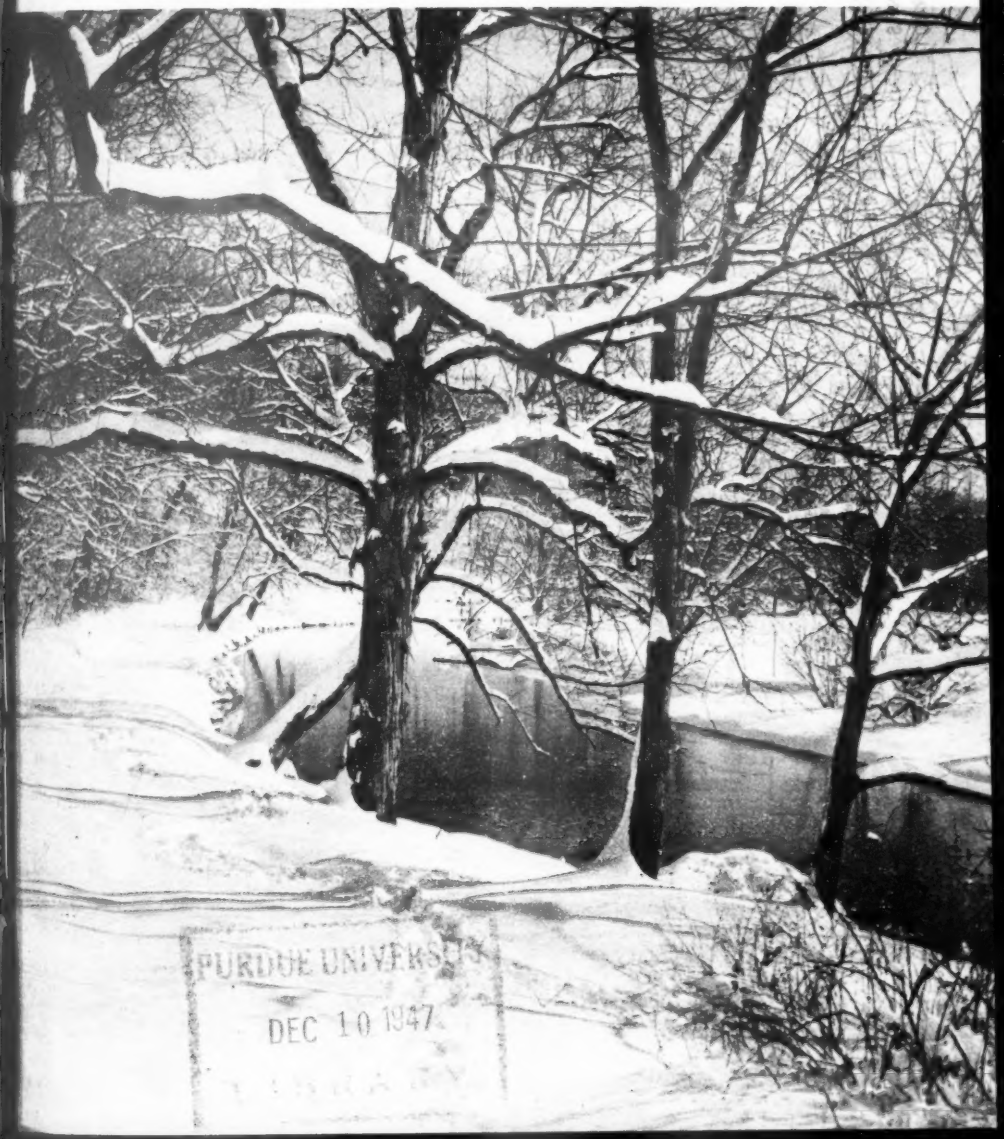

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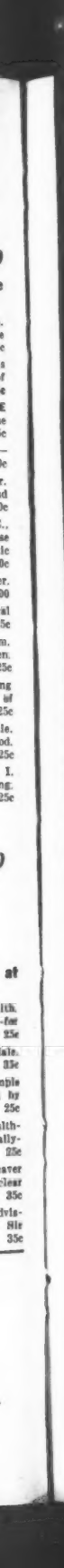

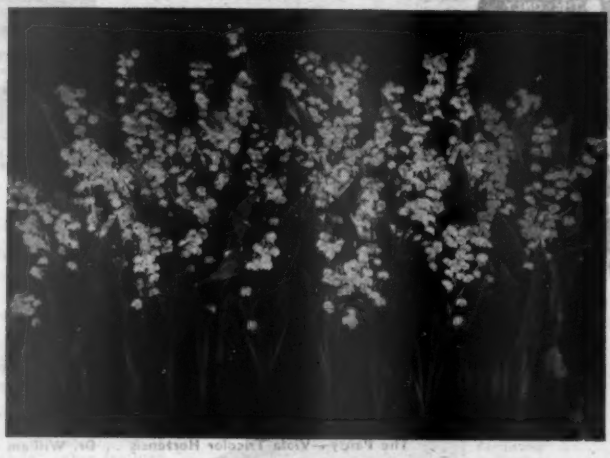

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Organic Gardening

VOLUME 11
NUMBER 6

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STUBBORN HUSBAND

August 12, 1947.

No words can express how well I like to read your literature. I only wish there was some way to get my husband to read your publications—he calls them trash. He thinks that he knows all that he needs to know. I wish there was some way to knock loose his stubborn knots.

A Reader.

—o—

ORGANIC FARMING

October 8, 1947.

If you would accept a humble constructive suggestion, I shall say that I believe Organic Gardening could accomplish greater results if it stressed more aggressively the matter of organic fertility, humus, etc. for the larger acreages by persistently turning under or rather disking green manure into the soil. There seems to be more of this done now and in recent years than before but there is much to be done still. If the ground is sufficiently prepared in this manner, the need for a shot in the arm, so to speak, would not be necessary. The farm representatives at State Headquarters do not mention this last feature when advising how much or rather how many pounds of chemical fertilizers to use for thus and so.

Also I think it would be helpful if you had the space sometime to rehash, say about three methods of compost making in a bit more definite manner, especially in regard to the matter of heaping when worms are used to do the turning. I fear there are many who are confused on some of the various phases of compost making. It

would be well also to mention the recommended substitutes for manure.

A. W. Arrington, Sr.,
Troy, North Carolina.

—o—

BRUCE'S QUICK RETURN METHOD

October 13, 1947.

In the October, 1947 issue of Organic Gardening I note your request to readers to tell you of their experience with Miss Bruce's herbal powder.

I have made a thorough test of this powder. I first repeated the experiment described by Miss Bruce on page 22 of her booklet. I prepared six jars of compost. Three I treated with different quantities of the water extract of her powder, the other three I left untreated as controls. I kept them in a warm spot in my cellar and watched them most carefully, noting the temperature in each jar every other day. Soon after the temperature had reached a maximum and had begun to fall, I emptied out the jars and examined them.

Throughout the test, the behavior of all six jars had been almost identical, and on examining them I could see no difference between any one sample and any other. I therefore mixed the three treated samples together with the three untreated and continued the test for another six weeks. Once again, I turned them out and examined the two heaps. As far as I could see, they were identical.

At the beginning of April, I made two heaps outside. As far as I could contrive it, they were of the same size and the same composition. One was treated according to Miss Bruce's instructions, the other was not. On June 7, I opened them up. It was impossible to see any difference between them.

You will see that my results with the powder have been completely negative. I believe that any good results obtained by following Miss Bruce's directions have nothing to do with the powder but are due to following her general procedure, which, you

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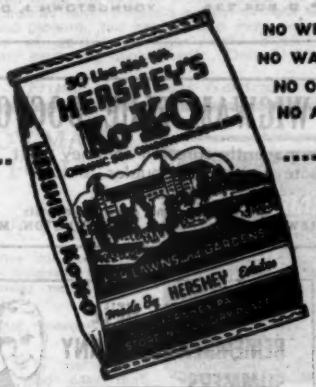

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—o—

BEAN BEETLE CONTROL

August 22, 1947.

I feel encouraged to send you this item on the Mexican bean beetle for Organic Gardening. This beetle is a much-neglected pest—the Japanese beetle having stolen the show—and it is no compliment to the home gardener to say that it is only due to the indifferent, frivolous, and sometimes even facetious attitude of the gardener that this destructive pest is not a thing of the past; for the commercial gardeners seem to be able to keep it under control.

The Mexican bean beetle may occasionally feed on the nightshade or any other plant. I have seen them feeding and ovipositing on blackberries, but the bean beetle is not an omnivorous insect; it is strictly a bean beetle. So far as I can see there are three possible ways of controlling the bean beetle: 1. some poisonous plant that the beetle greatly prefers over beans, but such a plant is not likely to exist. 2. some insect or other animal that will prey on the beetle. This insect, even if found, would take many years to get established, besides natural control is never absolute control and control of the bean beetle to be effective must be absolute. A single pair of beetles, if allowed to breed, is enough to destroy a whole population of beans.

The only remedy left is: 3. hand-picking. Control of the Mexican bean beetle by hand picking is not impossible and not difficult and not very laborious, but it does call for watchfulness and concerted action. This beetle winters over in the adult state. Rather late in the fall—I have seen them feeding as late as October 22 and after two severe frosts—the beetle seeks a convenient place to

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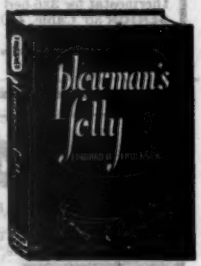

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pass the winter. I have reasons to believe that not every beetle survives the winter, perhaps not many do. About the last of May or early in June in this locality, the beetle puts in an appearance in the bean row; however, not many of them. While the bean beetle usually works on the under side of the leaves, in the early part of the season, it is most often seen on the upper side of the leaves, making picking so much easier. As a matter of fact it seems to invite being picked. If every gardener picked the few beetles from his bean plants at this time, and kept a close watch for some stray beetle or some possible focus of infection, in no time there would be no beetles to pick. Think how much time, disappointment, frustration, and bad blood the gardener would save himself.

Manuel Calvo,
12 Dresden Street,
Kensington, Md.

(EDITOR'S NOTES—Sanitation in the garden is doubtless the greatest single factor in the control of diseases and insect pests. A garden free from dead plants and seeded in some cover crop will not be a favorable place for wintering over diseases and insect pests).

—o—

WONDERFUL CROPS

August 9, 1947.

My own work in organic fertilizing is fairly well advanced and I have two wonderful crops of seed this year, from this method and from some others that have good promise. Most of the work that I wanted to carry on was among fellow members who are interested in this manner of farming.

I may state for your information that I have written many articles on my findings for the local papers, and in due course of time I will have interesting information for our members. I have enough data now to prove the contention that the organic method is the coming method of farming.

Harry Turnbull, Director,
B. C. Co-op Seed Assn.,
White Rock, B. C., Canada.

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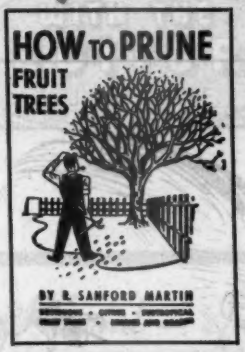

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IN MEMORIAM

SIR ALBERT HOWARD, C.I.E., M.A.

DIED — OCTOBER 20, 1947

Honorary Fellow of the Imperial College of Science, One-time Director of the Institute of Plant Industry, Indore, and Agricultural Adviser to States in Central India and Rajputana.

Sir Albert Howard — In Memoriam

ON October 20th the sad news came across the cables that Sir Albert Howard had quietly passed away that morning of a heart attack suffered at his home in Blackheath, nine miles from London, at the age of 74.

It is deeply distressing to think that the leader of the organic farming movement is no more, that he who has won international fame for his labors in the interests of the soil will soon be laid to rest in that same brown soil which was the passion of his life. It is still incredible that the man from whom we heard in every mail, whom we plied with a thousand questions and whose magnetic personality and deathless friendship were felt in every sheet and envelope he sent, has passed from the scene. Although he had continued to work unremittingly until his last moments and had seemed to be in good health, it is certain that the trying conditions with which he, like all his fellow Britishers, had been coping in these recent years had been insidiously undermining his vigor.

Circumstances and conditions militated against the Howards' acquisition of a place large enough to produce their own food, which, had they been able to achieve, would undoubtedly have meant the prolongation of Sir Albert's life. Food being scarce in England, friends on this side occasionally sent packages to the Howards, a mere token endeavor to help. Still, he lived beyond the Biblical allotment of three-score years and ten.

It is one of the insolaceable regrets of my life that I never had the honor of meeting Sir Albert personally. Yet I feel that our relations have been as close as if we had had weekly meetings in the intimate sessions of personal friends. We needed only to ask a favor of each other to find it done. Sir Albert would search in the second-hand stalls of London bookshops in which to find some rare book of which I had need. Recently he undertook the task of obtaining some photographs from the Royal Geographical Society for a book which I am engaged in writing. On our side, we filled the need of Sir Albert for books and bulletins. We were like inseparable, inveterate friends.

I was frequently delighted by Sir Albert's copious-use of American slang in his personal letters to me. Sir Albert's honesty and flexibility always inspired in me the most profound respect and veneration. He had developed the Indore method of making compost over a period of thirty years in India and attained world-wide fame because of it. One would imagine that he would have ardently preserved and doggedly fought over its every tenet, every split hair of its principle. Yet, when we discovered on this side of the

ocean that the two turnings of the compost could be eliminated by employing earthworms for that purpose, he applauded heartily, reprinting in his publication, *Soil and Health,* our article describing that method. On other occasions, too, he zealously exhibited the same totally dispassionate and altruistic interest in contributions by others to his own life's purpose and project.

With his scintillating spark of genius and that paramount ability of leadership in his field, he corresponded with people all over the world, seeing the seeds of his work planted in New Zealand, Australia, Rhodesia, Palestine, India, Central America, Canada, the United States and many other countries where organic farming societies are now flourishing. He answered hundreds of letters every month, promptly and with exemplary thoroughness. Through my knowledge of him there were dozens of persons in the United States who maintained a steady correspondence with Sir Albert. It was a strenuous program for a man of 74, and demanded that he give unstintingly of his time, his energy, and his money.

He fought the chemical companies, the college professors, and all the vested interests that placed considerations of financial profit ahead of the welfare of man and that of the soil. Fearing no one, he gave others the courage to fight, himself setting the example and the pattern. A strong and stalwart bulwark, defender of the soil, he tilted intrepidly with the chemical dragons. He had a kind of picturesque grandeur and strength that commanded the admiration and respect of friend and foe. From his own richly metaphor-laden language comes the opprobrious phrase, "devil's dust," with which he dubbed chemical fertilizers.

On the very morning of his passing, October 20th, I received what I suppose I shall have to enshrine as his last letter to me. Dated October 15th: in it he pledged $100.00 as a donation to the new *Soil and Health Foundation,* saying "I will send you soon some suggestions about the work of the *Foundation.* This is only to say how pleased I am that you have made a beginning." It is for us to hope that the work of the Foundation will do honor to the memory of Sir Albert Howard.

Here is a word of advice given to the people of the United States by Sir Albert in that same letter: "Whatever your Government does, for heaven's sake try to stop them from lending us any more money. We could grow the food we want on this island, if we made a real national effort. The advice of the U.S.A. to John Bull should be: 'Root, hog, or die.' Once we got our soil into shape, England would be born again. Sometimes it is a case of being cruel to be kind. This is one such occasion."

We agriculturists thank him for his work in behalf of a troubled world, for his brilliant efforts in showing science that, unless it tempers itself somewhat, it may some day soon lead to world-destruction. In his eyes shone only the most compassionate love and devotion, that total dedication to the regeneration of the soil to which he gave his life.

Sir Albert Howard, the world salutes you! The world, both its great and its pitiable common men who must resign their sad lives to a long oblivion as they chant to Mother Earth their immemorially pathetic plaint, *'te morituri salutamus.'* Your memory, however, will be forever green. Your accomplishments will go down through the ages, your spirit haloed with undimming brilliance.

J. I. RODALE

A shrub that deserves to be better known. It has a great deal of charm and makes an interesting addition to the garden border.

Leonotis

by FRANCES HANNAY

LEONOTIS, frequently called "Lion's Tail", is one of the most beautiful and interesting of the perennial autumn flowering shrubs. The plants are natives of South Africa and are grown extensively in England and all of the Colonies. Leonotis is not well known to American gardeners, and surprisingly few are aware of its great charm and advantages when used as a greenhouse plant in the North or grown in the open borders throughout the South.

The dense whorls of chenile-like, deep orange flowers rise tier upon tier on the long stems. The flowers, which amusingly resemble a lion's tail, have a long blooming season as they begin to open in September and continue through October and November. The graceful shrubs grow from three to six feet in height and make fine background border plants, as they provide a mass of lovely color.

The shrubs thrive in ordinary garden soil in a sunny location and require very little water during the summer months. During extreme cold weather, the plants may become blighted and may need to be cut back, but they will grow out again from the roots. Leonotis may be propagated by cuttings or grown from seed, or sizable plants may be secured from several nurseries in the South. The unusual and decorative flowers are very effective when cut and have good lasting qualities.

Sir Albert Howard, C.I.E.

By V. MARIE HAMILTON

BLACKHEATH, nine miles to the south-east of London, through which has run the Dover Road since Roman days, is situated high above Greenwich and the River Thames. From the Heath, once a favourite haunt of highwaymen and robbers who used to beset coach and solitary horseman alike with romantic frequency, Greenwich Observatory is within easy walking distance. And if one walks on past the observatory and down through the park, one reaches the Royal Naval College at the river's edge, which is gracious and old and full of history: built as a palace by the English King Henry VII, it later became a Naval Hospital, and is now a Naval College—the University of the Navy, as it is sometimes called. Here, on a great day for England, the Tudor Queen, Elizabeth, was born: here Samuel Pepys once had his offices: here the body of Lord Nelson once lay in state, and in a great quiet, for the joy had gone out of the Victory of Trafalgar leaving only gratitude and thankfulness which have never died.

To-day from the window of a pleasant room in an unpretentious house in Blackheath a powerfully-built little elderly man looks out upon the immense field of his life's endeavour.

His eye traverses the great plains of India—the Indian States, the United Provinces, Bengal: he sees again the arid hill country of Baluchistan, and then looks eastward to Assam, and south—far south, to Madras and Travancore. His gaze takes in the fertile island of Ceylon, then wanders to the infinite variety of Africa—Morocco, Tangier, Egypt, Kenya Colony, the Rhodesias, Natal, the Karroo: the West Indian Islands come under his survey, and the plantations of Latin America—Costa Rica, Guatemala, El Salvador. Nor is the European scene omitted—the Midi of France, Germany, Holland. He sees rice, wheat, barley, rye, sugar, cotton, cane, citrus, tea, the pulses, oil seeds and fibre crops of India, coffee, cacao, maize, vines, tobacco. Most of these are staple foods of mankind all the world over, and all of them he has himself grown, and studied intensively at one time or another.

Perhaps in these days he looks more often upon the homely English scene—the hop fields of Kent, the fruit orchards of the Evesham Valley, the downland of Wiltshire, the fine agricultural counties of Somerset, Shropshire and Hereford, the windswept Eastern Counties.

It is a vast panorama and over-all, everywhere, to a greater or lesser degree the valleys are greener than they were, the plantations more fertile, the crops healthier, the minds of the cultivators easier, the land in better heart than it was twenty, ten, five years—perhaps even than it was only one year ago: it matters not where he looks for everywhere is to be seen the projection of his great idea, the results of his labours writ large upon the land, the reward of his vision.

When all is said, a man of whom this is true must be a great man: the powerfully-built little elderly man of whom it is true is Sir Albert Howard, Honorary Fellow of the Imperial College of Science.

Albert Howard was born in the year 1873 near Bishop's Castle in Shropshire. His people had been farming folk for many generations in this,

one of the loveliest and at the same time most agricultural, of English counties. Born and bred on a farm, his childhood seems to have been exceptionally happy, and certainly for a future agricultural scientist both circumstances and environment were ideal. Intelligent and quick-witted, he absorbed naturally the even rhythm of life and work on a farm and became steeped in country lore: remote from the direct and indirect distractions of great cities, an original mind was left undisturbed to develop in its own way and exercise itself upon the only material at hand, namely, Nature's round in all its aspects: the land, the business of farming, the farm labours, the neighbours, the farm animals (for this was, as a matter of course in those days, a mixed farm).

The father must have found his eager, observant lad companionable, for it is clear that he succeeded in imparting to him not only much of his knowledge and a profound respect for natural law, but also a love of the good earth, of this corner of which he and his forefathers had been faithful custodians for generations. The boy, on his side, could not but remark the high local reputation his family enjoyed (and still enjoy) as good farmers. He looked about him at the ample acres, the luscious meadows, the healthy crops, the sleek herds, the contented faces, and it made a picture in his mind, a picture of "land in good heart," which was never to leave him. He recalls it still in its entirety, in all the detail of its "rightness."

The young Howard, however, was to be no country yokel. A Celtic passion for "education" asserted itself. From the village school he insisted on going to a private school. The present Wrekin College at Wellington, in those days a private school, suggested itself and he went there. Thence by way of an open scholarship in the year 1893 he reached the Royal School of Science in London (now the Imperial College of Science and Technology), standing first in England in chemistry and physics. Here under the excellent tuition of the day was laid the broad foundation of a spectacular scientific career. Besides chemistry and physics, he studied mechanics, geology, land surveying, agricultural engineering, educating himself the while with remarkable determination and judgment, so that by the time he reached Cambridge University by way of three open scholarships, he was not ignorant of the stern realities of the world about him, nor of the agricultures of the past.

Equipped with a First in the Natural Sciences Tripos at Cambridge, and the Diploma of Agriculture, six years intensive study behind him, he felt himself qualified to begin his work as an agricultural investigator.

In 1899 Howard was appointed mycologist and agricultural lecturer to the Imperial Department of Agriculture for the West Indies: it was a high-sounding appointment but it did not prove altogether happy. In his capacity as mycologist he was responsible for certain intricate researches on the fungous diseases of crops, while in his capacity as lecturer he had to make extensive tours among a number of the West Indian Islands, lecturing and advising all and sundry on the growing of tropical crops in general. This meant that he was expected to investigate plant diseases in the laboratory, and pass on the benefits of his specialized findings direct to cultivators engaged in growing a wide variety of crops of which he himself had as yet no practical experience, under tropical conditions, the bearing of which upon crop production he as yet imperfectly understood.

To Howard there was something wrong here: it was like making a young doctor a consultant before he had held a post as house surgeon or house physician, when he was without sufficient hospital experience. Indeed, it was worse: for in his own case he was without sure and certain knowledge of the normal development of these crops, or their reactions to the

given conditions *in health*, yet was called upon to diagnose and prescribe for disease.

He indulged in some careful thinking: were the disorders upon which he was called upon to advise necessarily disease at all in any true sense? Could they not more properly be described as extreme maladjustment—the final result of improper cultivation? Until he had grown the crops himself under optimum soil and cultivation conditions, he could not know. He must have land at his disposal: he asked for it, and it was refused.

To his amazement, the authorities failed to take his point. In 1902 Howard decided to give up the job and return to England.

In point of fact this first appointment proved indirectly of enormous significance. In the first place it enabled him to lay a useful foundation for his later unrivalled knowledge of tropical agriculture, and secondly, owing to its unsatisfactory nature—peculiarly exasperating to the farmer in Howard—it exposed the then growing tendency in agricultural research to divorce practice from theory, thus enabling its victim to pose correctly possibly the most important question of his life—Is disease inevitable? Is it an act of God, against which man must strive importently all his days? Or is *health* the act of God, after which man must forever strive—the lodestar by which the scientific observer must take accurate bearings from time to time if he wishes to keep on his course?

The summer of 1903 found Howard installed as botanist at the South-Eastern Agricultural College at Wye in Kent. Here he was placed in charge of the experiments then being undertaken on the growing and drying of hops. His work brought him into contact with leading hop-growers and he met them, as he realized thankfully, not as a mere investigator but as another grower: specialized theory was wedded to specialized practice, admittedly in a small and limited sense; but a big thing came of it. Howard tells the story in a single paragraph in his last book—*Farming and Gardening for Health or Disease* (Faber and Faber, London, 1945).

'I began to raise new varieties of crops by hybridization' he writes, 'and at once made a significant practical discovery—the almost magical effect of pollination in speeding up the growth and also in increasing the resistance of the developing female flowers (the hops of commerce) to green-fly and mildew (a fungous disease) which often did considerable damage. The significant thing about this work was that I was meeting the practical men on their own ground. Actually their practice—that of eliminating the male plant altogether from their hop gardens—was a wide departure from natural law. My suggestion amounted to a demand that Nature be no longer defied. It was for this reason highly successful. By restoring pollination the health, the rate of growth, and finally the yield of hops were improved. Soon the growers all over the hop-growing areas of England saw to it that their gardens were provided with male hops, which liberated ample pollen just as it was needed.'

Howard describes this as his "first piece of really successful research," and it is interesting, in that it is typical in *genre*, approach and ultimate result of all the other problems that he has since tackled in forty odd years. First there is the extremely simple idea—the "hunch," the thing that nobody else has happened to think of; next comes the practical approach, in absolute conformity with natural law; and lastly, there is the now happily familiar outcome—'Soon the growers all over the hop-growing areas of England saw to it that their gardens were provided with the male hop.' Of course they did!

The South-Eastern College at Wye, however, was not to be the scene of his major labours. In 1905 two momentous events occurred: first, his marriage to Gabrielle Matthaei, and secondly his appointment as economic botanist at the Agricultural Research

Institute about to be founded at Pusa in Bengal by the late Lord Curzon, then Viceroy of India. In both Howard was incredibly fortunate.

His marriage brought him more than happiness: it brought him also a colleague of remarkable ability, whose mind was completely in tune with his and whose scientific training was every whit as good. The late Mrs. Howard herself obtained an appointment as investigator in the Department of Agriculture—one of the very few official posts ever given to a woman by the Government of India. She held this for twenty years, and was also awarded by the King Emperor the Kaiser-i-Hind Gold Medal for public services in India. Together they wrote some one hundred and fifty scientific papers, and three books devoted to various aspects of Indian agriculture.

When Howard reached India in May 1905, the new Research Institute was not yet in being and he was able to secure some seventy-five acres of land adjoining the Pusa Estate and thus assuage his inordinate thirst for land upon which to try out his ideas. He had been given a clear directive—to improve crop-production by scientific plant-breeding methods, and with characteristic thoroughness he set to work to prepare for the task.

His first five years in India were spent in learning how to grow the crops which he hoped ultimately to improve, and he chose to do so in strict conformity with the methods employed by the native cultivators about him. In the course of his scrutiny of local practices he made one striking discovery: the crops grown by these cultivators were singularly free from insect pests and fungous diseases. Had he been right then in Barbados, when he had first suspected that optimum soil and cultivation conditions could eliminate disease? He decided upon a revolutionary experiment. In growing his crops now he would concentrate his whole attention on soil, seed and cultivation conditions could eliminate disease? He decided upon a revolutionary experiment. In growing his crops now he would concentrate his whole attention on soil, seed and cultivation, and allow insect and fungous diseases to develop unchecked. The result was worth noting. In five years time his crops like those of the cultivators about him, were comparatively free from disease.

Excited by this clear evidence that he was on the right track, Howard ventured on an even more revolutionary experiment. The Indian cultivators, successful as they were with crops, were less fortunate with animals and epidemics of rinderpest, septicaemia and foot and mouth disease among the oxen, everywhere used as work animals, were frequent and devastating. It occurred to Howard that what seemed undoubtedly true of crops might prove true also of animals, and, provided due attention were paid to their feeding, housing and management, these latter might respond in a like manner, developing a comparable disease resistance.

He had great difficulty in obtaining the finely bred oxen he needed for his purpose, indeed only through the intervention of the Member of the Viceroy's Council for Agriculture did he achieve it, but the results surprised even himself. He did nothing to segregate the animals when they came, or treat them prophylactically in any way whatever: they were frequently in contact with diseased stock, particularly with foot and mouth cases, but they contracted no disease. On the contrary, Howard was able to prove to his own satisfaction, even on this very small scale, that healthy animals, suitably cared for and properly fed did in fact develop an altogether remarkable degree of disease resistance. The sickness among animals that prevailed elsewhere in the locality was seen therefore to have been largely, if not wholly, attributable to insufficient food and ignorant management. In later years, at Indore, Howard repeated these experiments with a much larger number of oxen, and fully confirmed his first findings.

To return to the main line of advance, however, which Howard pursued throughout his twenty-six years in India—his most important proven observation was that the foundation of a sound agriculture lay not in the plant but in the soil, and that the fertility of the latter was the paramount factor in all cultivation. An improved variety, say of sugar cane, would increase the yield in a measure, but an improved variety *plus* improved cultivation, could and did increase it again, as much as threefold. It followed that soil fertility must be the investigator's main preoccupation, for without it no discovery, however epoch-making, would be of any real use. Could he but increase the soil fertility in India, the way would be clear for great advances.

Between the years 1911 and 1918 Howard was provided with a small experimental farm at Quetta, where he spent each summer. Here he found lack of humus, coupled with the aeration of soil under irrigation to constitute the chief problem. He remarked with ever-growing interest, however, that in the native cultivation of fruit under these conditions there was no disease. Examining the local practices, and following them himself, he found they included a highly skilled use of animal manure, the provision of which necessitated that every cultivator should keep some livestock.

As his experience of native cultivation methods increased, so also did his mastery of the scientific interpretation of their success, and he began to feel his way with greater and greater certainty towards the solution, not of this or that problem only, but of the whole complexity of crop cultivation in India. He became convinced that in humus lay the secret of successful and permanent agriculture, and that in *more* humus lay the salvation of Indian crops. Realizing himself to be on the verge of a great step forward, for he had succeeded in relating his findings in a number of researches to this central theme, he now needed more scope, complete freedom of action, money, and of course, more land, in order to carry out on a large scale certain ideas that had suggested themselves.

There had however been changes in the Research Institute at Pusa during these years. A research organization was developing there on lines very different from those envisaged by Howard. The gospel of fragmentation had found its way there and narrow sectional research was preferred to the projected advance on a wide front foretold by Howard. Officialdom had reared an untimely head in research, and officialdom, as Howard encountered it both then and later, aped a man looking through the wrong end of a telescope—vital issues could not be detected at all in the resulting smallness of vision. He spent six years kicking against the pricks.

At last, however, fortune smiled again. In 1924 he was appointed director of the newly formed Institute of Plant Industry, Indore, Central India, where he had three hundred acres of land at his disposal, ample finance, and a free hand. His directive now was to improve cotton production, and Howard shrewdly surmised that if he could bring his researches on soil fertility to a successful conclusion, the cotton problem could also be solved. And so it proved.

The Indore Process for composting animal and vegetable wastes was devised and perfected.

A complete series of experiments were carried out at the Institute to establish scientifically the main chemical, physical and biological processes which went to the formation of humus in a compost heap, and the results were later published in the joint names of Howard and his collaborator—an Indian chemist named Y. D. Wad. The compost resulting from this Process year after year made of the three hundred acres belonging to the Institute an oasis of complete fertility in the surrounding plain. The Howards had written an account of their stewardship *on the land,* and signed it with their name.

In 1930 Mrs. Howard died—a terrible grief to him—and in the following year Howard retired from government service. He returned to Europe sadly in need of rest after twenty-six years in the tropics.

While his body rested, his mind and eye retained their customary alertness. He read much: he delved into modern agricultural research. At the same time he travelled, both at home and abroad. And he was frankly appalled at what he saw and heard. Soil erosion, flood, barren acres, derelict farms, over-cropping, over-stimulation, ubiquitous disease in crop and livestock, marked deterioration in the quality of agricultural produce—all betrayed the sickness of the good earth. On the other hand, he saw the phenomenal rise of the upstart artificial manure industry, the colossal increase in the manufacture and sale of chemicals of all kinds for agricultural purposes, together with machinery for their use. The picture alarmed Howard. He saw the eternal fertility principle, upon which the Orient had successfully based forty centuries of intensive agriculture, and he himself a quarter of a century's highly successful agricultural research, set at nought —whether from ignorance or from greed mattered little, though it seemed to him that more often it was both.

In the East "Custom is king," certainly, but custom of necessity securely based on Natural Law, for any serious departure from Nature's rules in the tropics is apt to exact immediate retribution: there is no hope of muddling through in time-honoured English fashion.

There, in the East, the great principle of soil fertility was respected and understood: cultivation operations were timed to use and not conflict with natural forces: ancient crop varieties maintained themselves from century to century: the soil stayed put, and disease in the utterly fantastic form (alas, so common in the West that it is scarcely noticed) simply did not exist.

Here, in the West, scientific investigation seemed completely off centre, and the investigators appeared blind to the wider biological, physiological, even philosophical implications of their fragmentary specialized laboratory research. The simple practices of good husbandry were no longer spoken of: the slow precision of Nature was not respected: her maintenance of vast reserves was ridiculed: the principles underlying fertility were not understood. Humus was squandered senselessly and Nature's sharp warnings (in the shape of disease) were misconstrued to indicate an ever-increasing need for chemicals in the form of poison sprays and washes for the crop and stimulants for the soil. The evil, the danger, the folly of this procedure revolted Howard. The chemical industries alone stood to profit by it: the vested interests had already obtained a stranglehold.

In 1933, his travels took Howard to South Africa, where he found that his Indian reputation had preceded him. The book written by himself and Y. D. Wad—*The Waste Products of Agriculture: their Utilization as Humus* (Oxford University Press, 1931) was in the hands of some of the planters. He saw one coffee estate where his Indore Process for composting had already been adopted. At the same time he was receiving letters and reports from other parts of the world expressing interest in his work and a desire to profit by his experience. His "correspondence" had begun.

Could his Process extending the fertility principle, devised to help the India cultivator, save Western agriculture? He rather thought it might. He was aware, of course, that the task of convincing the West of the urgency of his message would be infinitely harder than confirming the East in its traditional respect for it. He realized that he would meet with official mistrust, obstruction, derision—open opposition perhaps. The prospect was grim enough to daunt a far younger man. Yet in 1934, his services in India recognized by a knighthood, Sir Albert Howard raised his flag in Eng-

land. He would do battle in the cause of Mother Earth until his dying day!

The slow unravelling of the subtle and complex relationship between humus and health, the revealing of the significance of the mycorrhizal relationship in the roots of most food crops, the clarification of the labyrinthine nitrogen processes in Nature, the claim that if plant proteins were correctly synthesized 'their disease-resisting powers first protect the crop and are afterwards duly handed on to the animal and the man,' in support of which medical evidence is now forthcoming—these are some of the researches successfully concluded during his retirement under the stimulus of his direction. Sir Albert Howard is now the consultant *par excellence* (except that he refuses payment for his advice): he owes much—he himself would say everything—to the practical men, planters, farmers, market gardeners and many others, who, stimulated by his vision and encouraged by his absorbing interest in their doings, have accomplished so much.

"Humus Experiment Stations," as they might be called, have sprung up in places as far apart as Costa Rica and Natal, in vast estates and in tiny allotments. Compost Societies have been formed as near to his home as Bromley, Kent, and as far from it as New Zealand. He is the pioneer of all pioneers in the realm of organic farming and gardening. Of his book—*An Agricultural Testament* (Oxford University Press, 1939)—seven editions have been printed (15,000 copies): of his last book—*Farming and Gardening for Health or Disease* (Faber & Faber, 1945) four English editions have so far been published (9,000 copies), and there has been one American edition published by the Devin-Adair Company, N. Y. (5,000 copies). His quarterly journal—*Soil and Health*—has a circulation of 6,000, and this within a year of its beginnings.

A word must be said on perhaps the most practical advance now being made as a direct result of Howard's lead during the last decade. This concerns the utilization of town wastes and sewage for the land.

In the case of the peasant cultivator in the East the return of all wastes, animal, vegetable and human, direct to the land is at once natural and necessary. It was borne in upon Howard, first that this practice was in itself sound, and secondly, that where it obtained, it was the basis of a sound agriculture. In the West, however, the return of human wastes derived from great cities to the land seemed at first sight quite impracticable, and even undesirable. On the other hand he realized how uneconomic were the systems of waste disposal, not only in urban but also in rural districts. Disproportionate sums are expended yearly in the city of London alone in getting rid of these so-called wastes: might it not be possible, some day, to compost them all together and use the resultant product to restore and maintain the fertility of the land? A remarkable vision of progress, this!

Slowly, soberly, Mother Earth's champion has been about her business. He has talked and lectured and written, travelled here, travelled there, written some more; until imperceptibly the clouds of difficulty, deep-rooted prejudice, vested interests and indifference began to disperse. To-day the snow-peak of achievement can dimly be discerned. Town wastes are already successfully composted in Costa Rica, Rhodesia, India and elsewhere: dried sewage sludge is already on the market in England. In two states in Central America a finished compost is being marketed, made from *all* town wastes, including sewage residues.

It is possible that the future will remember Howard as the practical visionary whose acute mind first perceived the only progressive solution to this most urgent problem of modern civilization, namely how to restore and keep true Nature's balanced economy, dependent upon the return of all wastes to the land, under modern (i.e. artificial) conditions.

And so it goes on . . .

It is as though Mother Earth had long ago accepted her sober, sensible, great-hearted "Champion" with the twinkling eye, and taken him fully into her confidence. His unshakable convictions, his kindliness, his homeliness, inspire both courage and patience in others. He possesses to a marked degree the capacity to 'get along with folks': there is no humbug about him, no posturing, no striving after effect. All is orderly and straightforward in the storehouse of his mind.

Sir Albert Howard has that "priceless gift" which Winston Churchill attributes to the late Lloyd George. 'The one,' writes Mr. Churchill, 'without which all other gifts are so frightfully cheapened . . . 'the seeing eye': that deep original instinct which peers through the surfaces of words and things—the vision which sees dimly but surely the other side of the brick wall, or which follows the hunt two fields before the throng.'

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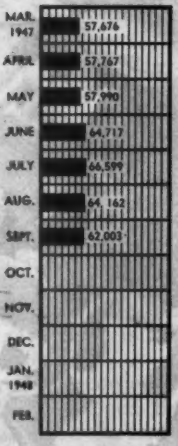

Watch this graph. It will give you an opportunity of seeing how our circulation stands from month to month.

Pansies **Clewell**

The Pansy — Viola Tricolor Hortensis

By DR. WILLIAM H. EYSTER

(EDITOR'S NOTE:—This is the first of a series of character sketches of garden flower plants.)

THE pansy has been a favorite garden flower plant for more than two hundred years and in this time has acquired many interesting and significant names, such as love-in-idleness, heart's ease, ladies' delight, and Johnny-jump-up. From Shakespeare's "A Midsummer Night's Dream" we may infer that the pansy was a *western* flower and was used as a component of love potions.

The violet family to which the pansy belongs includes plants with fleshy underground stems which give rise to the leaves and flowers as in the common blue violets in our woodlands, and plants with aerial stems which bear the leaves and flowers as in the yellow wood violet and the pansy. Some violets have hairy leaves and flower stalks, but pansies always are without epidermal hairs. The heart-shaped, long-stemmed leaves have crenate margins. The spurred flowers are small in the old-fashioned heart's ease, but are very large in the recently developed varieties and hybrids. The interesting face-like flowers occur in good shades of blue, yellow, purples which approach good reds, and white. This is without doubt the most popular and best-known of the dwarf, hardy, herbaceous flower-garden plants.

Pansies have a way of persisting in our gardens in spite of neglect and misuse or even abuse. To have them at their best, however, the seeds should be sown in well-drained soil rich in compost and in a sunny location. Seeds sown the middle of July will form seedlings that can be transplanted the first week of September and grow into plants that can pass through the winter successfully. In December after the ground has frozen, mulch the plants so that they are hidden from view. The mulch should remain on the plants until the frost is out of the ground in the spring. The mulch prevents the thawing and freezing of the soil which tend to partially uproot the plants. It is well to transplant the seedlings in the garden where they may grow to maturity because the oftener pansy plants are transplanted the smaller will be the flowers.

Pansies can be put to many uses, as border plants, for masses of bright colors in early spring and late fall perennial beds, for interplanting bulbous and other perennial plants, and for cutting. What spring-flowering plant produces flowers more abundantly and at the same time is as picturesque in the garden?

The giant-flowered pansies of recent years have been developed from the tiny heart's ease of Shakespeare's day. There are many named varieties which are favored by gardeners who enjoy distinctive color combinations. To keep the plants in almost endless bloom, cut off the flowers so that they do not produce seeds.

Trace Elements — Boron, Molybdenum, Cobalt, Iodine.

By DR. EHRENFRIED E. PFEIFFER

OF all the trace elements *boron* is one of the most important and interesting. Concentrations of it have a poisoning and damaging effect upon plant growth and yet, curiously enough, a boron deficiency may cause symptoms similar to those resulting from an excess. It has a marked influence upon the respiration of plant cells. In laboratory experiments, dilutions of 0.0006% have given the best results. It regulates the evaporation of water from plants, especially in the case of alfalfa, clover and grasses, and increases, therefore, their resistance to drought. Heart rot and dry rot in sugar and other beets are typical boron deficiency diseases and can be prevented by the addition of 4-5 lbs. of borax per acre. Tomatoes and tobacco also like boron. Of all plants, cotton requires it most (15 p.p.m.*), an amount which would have a damaging effect upon grasses It is present in amounts of 3 to 36 parts per million in the dry substances of plants, highest in legumes, lowest in grains. The boron content of plants increases in the change from the wet to the dry season. Its content is highest in apple trees in June, for instance. The growth of the leaves on grafted shoots is determined by the boron in the roots of the stock. It counteracts decay producing bacteria (nitrogen loss) in the soil and favors nitrification, particularly of ammonia, but it cannot accomplish these things in alkaline soils.

Excessive liming fixes all boron so that is becomes inert. Then none of its beneficial effects will occur. An excess of potassium increases the severity of boron deficiencies and the damaging effects of too much boron as well. Nothing can illustrate the principle and need of "balance" better than the story of boron. However, in scientific experiments with nutritive solutions much study was required to find the proper balance. Merely to add boron when there is a deficiency is not enough. The soil or solution must be "ready", well balanced in advance so that the boron may be effective. Two factors have been clues in this connection. One is that boron acts best in the presence of silica. Loamy, heavy clay soils would, therefore, respond better if sand or other forms of silica were there. Perhaps the old Chinese custom of collecting pebbles and putting them around the fields has a bearing here. Then, too, there is the practice (handed down to us from the Middle Ages) of using diatomaceous earth (kieselgur) in a fine "trace" dusting around cabbage, lettuce, beans and other garden products. This practice has produced remarkable results growth and health. The second factor is that an excess of boron in nutritive solutions caused severe poisoning which was avoided when humus colloids were added to the solutions. Then the stimulating effect alone was observed. Humus, once more, plays the balancing role and acts as a buffer. When we speak here of an excess you must realize that we still mean "trace" per million, while 0.01 to 0.5 parts per million act "normally". If a soil is amounts of the order of 5 to 10 parts deficient in boron (below 0.01 parts per million) then liming or heavy dressings of potassium fertilizer aggravate the symptoms. Again, if there

*p.p.m. is used as abbreviation for "parts per million".

is an excess of potassium the damage of excessive boron poisoning is increased; on the contrary calcium can counteract the excessive boron poisoning. Here, however, lies another danger—heavy liming increases boron deficiency in plants like swedes and beets. Oats, tobacco and alfalfa will only grow normally if there is a balance of boron, calcium and potassium. The ideal proportion for sugar beets seems to be 1 part of boron to 100 parts of calcium, 1 part to 500 for soya beans, and 1 part to 1200 for tobacco. However, no generalizations can be made, but each case should be treated individually.

Boron also affects the metabolism of carbohydrates. One symptom of damage is the increases of sugar in the wrong places and the resultant rotting of plant tissue. In tomatoes, for instance, there was an increase of sugar in the leaves and a decrease in the stem. The cell juice becomes more acid and the cell walls break down, turn brown. The abnormal increase of acidity is accompanied by an increase of ammonia and the formation of proteins is inhibited. Plants are then very susceptible to fungus infections such as the rust which attacks flax. Boron can help flax build up its resistance to this disease. In general, boron injuries (those resulting from its lack as well as those from an excess of it) go hand in hand with the hypertrophy of cells, the degeneration of the cambium (the life layer in plants) and of the structure of the vessel carrying parts of the stems. Root caps also become diseased. Rice is particularly sensitive to an excess of boron while beans can stand and require more than peas. The proper amount of boron can increase the root development of soya beans by 100%, the leaf development by 50%. The formation of chlorophyll is also increased. Oil and fiber plants do best with 0.5 parts per million of boron. In apple trees the boron content is highest in June which may have a bearing upon the setting of fruit.

Diseases typical of boron deficiency are: heart and dry rot of beets and mangolds; canker, internal black spot of red garden beets; brown heart in swedes and turnips (the inner parts of the roots rot); the browning and abnormal growth of cauliflower; the cracked and split stems of cauliflower and celery combined with a brown mottling of the leaves; alfalfa yellows, not to be confused with leafhopper damage. When the damage is the result of boron deficiency, the growth-distance of the internodes is stunted and the yellow occurs on the terminal leaves. Other characteristic diseases are: top sickness of tobacco (the bases of the leaves are paler than the tips, the leaves stop growing, become brittle and discolored); internal cork or brown heart in apples; brown spotting of apricots, a disease typical of New Zealand soils.

In concluding the discussion of boron we must mention its sources. It is to be found in many animal tissues; however, nothing is known about the role which it plays there. It may be of particular interest to us to know that boron is present in natural rock phosphate (Florida for instance). The chances are that the chemical tretment of rock phosphates, in the production of superphosphate, may eliminate boron as well as many other trace elements. This would be one point in favor of the use of untreated rock phosphate. More data should be gathered on this subject. The natural sources of boron are certain silicates from which it is freed by volcanic ash, so that it is found in volcanic deposits (solfatara). It is also found in sea water at the rate of 1 part per million, in salt deposits resulting from sea water, in seaweed, in California grape vines, in berries, and in hops. These sources point to the value of compost!

An important trace element with which most of our readers may not be familiar is *molybdenum*. Its significance came to light when the causes of scours in cattle were being studied. It was found that scours sometimes resulted from feeding on tart or sour

pastures. These sour pastures contained 33 - 35 parts per million of molybdenum while normal pastures, which did not cause scours, had only 4 - 5 parts per million of it. Clovers and holcus lanatus (Woolly Soft-Grass) take up 4 to 10 times as much molybdenum as do grasses such as timothy or poa pratensis (Kentucky Blue-Grass). It was observed that new grasses contain less molybdenum than old ones. Ley farming would be the solution in such cases of soured land. However, we should not condemn molybdenum on the basis of what has just been said, because when it is present in a true trace form it is really beneficial, indeed essential for the fixation of atmospheric nitrogen by nitrate fixing bacteria. In sweet lake water lives azolla (an aquatic plant) which in cooperation with a nitrogen fixing bacteria (anabaena azolla) concentrates molybdenum. This water plant may contain 1 part per million of molybdenum while the surrounding water contains only one part per billion or even less. Here we have a case of selective enrichment. This brings up the possibility that water plants taken from lakes may be useful when used in compost to heal deficiencies. The trace character of this element is underlined when we realize that it may be present in plants even when it appears not to be present in the surrounding soil. Molybdenum, and vanadium too, favor the increase of azotobacter (nitrate fixer) in light, sandy soils, and improve the growth of legumes until the dangerous, above described accumulation is reached. The ratio of 5 parts per million of molybdenum to 1 part per million of boron in a soil seems to be ideal. Cobalt heals excesses of molybdenum in soils. Certain limestones contain cobalt and may be useful here.

Molybdenum deficiencies show up in mottled leaves on tomato plants, later there develop a necrosis of the edges of the leaves and turning (rolling over); additions of 1;100,000,000 of molybdenum salts could "heal" these symptoms. No fruit develops. Oats grown in molybdenum deficient water culturees react similarly. Nothing is known as yet about field crops.

Duckweed (lemna minor), which has intrigued us already with its property of accumulating radioactivity (its own radioactivity is 100 times that of the water in which it lives), also benefits from traces of molybdenum and stores it up. Compost made from it may be especially useful on a light sandy soil where legumes are to be introduced. Farmers in Bohemia have told the writer that duckweed makes an excellent pig feed increasing growth and health too. This same plant also appears to specialize in the accumulation of one of the rarest elements, namely gallium, in addition to boron and manganese. Another interesting feature of molybdenum is its seasonal increase in plants from May to October. It concentrates in the organs of blossoms from 0.5 to 4.5 parts per million.

Cobalt is related to iron and nickel due to its position in the periodical system of elements. There is nothing known as to whether it influences plant growth or not but surely it is a vital element for the health of sheep. A rapidly progressing disease of sheep, ending fatally, has been observed in New Zealand, Australia and Scotland. It is called Pining or Morton Mains disease. It did not occur on newly broken land but on land which had carried sheep for several years. Soil tests have shown that the cobalt content was close to or zero where the illness persisted, while on pastures with only 7 parts per million of cobalt the disease disappeared. Cobalt chloride, given to sheep in the most minute doses, was then effective in curing the symptoms. The cobalt content of the soil ranges from 1 to 300 parts per million. Below 5 parts per million the Pining disease appears. The cobalt content of herbage seems to be in direct relationship to its content in the soil. Cobalt, however, has a very peculiar effect upon the intake of another trace element, the already discussed molybdenum. Cobalt treated

soils influence plants to absorb an abnormally large amount of molybdenum (which would increase scours in cattle). Such a fact demonstrates how dangerous it can be merely to cure a deficiency by simply adding what is missing. The organic process is more complicated than that and it is always necessary to consider the whole, the living balance, the selective properties of plants, the buffered state of the soil, the colloidal structure of humus, and many other factors.

Iodine is another element which is necessary for human and animal health. The part it plays in the functioning of the thyroid gland and its hormonees is so well known that we need not describe it here. It is thought that iodine prevents goitre. In Switzerland where many people develop giotres, particularly in the jurassian limestone mountains, it is therefore added to the salt. Iodized salt is now a commercial article in this country too, both for human beings and for cattle. Whether it is a trace element which has any bearing upon plant growth, especially as regards field crops, is not known and is doubted. Seaweed, however, contains much iodine (another mark to its credit for compost). Soils contain very little of it, only 6 parts per million down to 0.4 parts per million. It has been observed in Europe that the iodine content of soils near the seacoast is high and that it declines further inland. Limestone soils are particularly poor in it. In Bohemia, however, it increases again. Japanese soils are especially poor, 0.1 to 0.04 parts per million. On the contrary the soils along the Shantung coast of China, where quantities of seaweed are washed ashore, are extremely rich in it. As high as 462 parts per million have been found in dried plants which were grown there. To this writer's knowledge the significance of iodine in relation to cancer has not yet been studied. But it is a peculiar coincidence that practically no cancer occurs in the Chinese Shantung area. It has also been stated by the French doctor Delbet that in areas with soils rich in magnesium there is little occurence of cancer (Egypt i.e.). Iodine is present in milk in very minute traces. Since it has recently been established that there is a cancer producing factor in the milk of mice which are bred to inherit cancer this problem should be investigated further.

Iodine is a typical trace element of the air. Cauer stated in 1939 that considerable amounts of iodine (90-230 tons per year!) were brought into the air by burning iodine rich seaweed before 1914. Since then, other, mineral sources of iodine have been discovered, mainly in Chile. 0.5 to 0.6 parts per million are found in the air, more near the seacoast, less inland. A rather striking observation has been made to the effect that the iodine content of the air was pretty constant up to about 1930 but that during the decade from 1930 to 1940 it decreased rapidly. Whether this was due to the rapid industrialization with its increase of smoke and soot has not yet been investigated. It is a fact, though, that the cancer rate of the industrial districts of the North is higher than that of the rural districts of the South. At present we only know that much still remains to be investigated in this field of the trace elements.

The last trace element worthy of our attention is *titanium*, which is always found in apple trees, peas, beans, potatoes, sugar beets, carrots, rye, oats, wheat and grasses, ranging from 10 to 120 parts per million of the dried substance. Compost made from the leaves of these plants should contain measurable amounts of it. Indeed, a study of the comparatively little that is known about the trace elements, their actions and interactions, their effects upon plant and animal, confirms the value of the greatest possible variety of composting materials, such as the leaves and stems, not only of cultivated plants but also those from wild plants, weeds, for instance. There may always be a chance that we will catch one of these rare elements.

Biological

BIOLOGICAL soil-building means the transformation of all the residues of life—vegetable and animal wastes, everything on the face of the earth which has ever lived and died—into topsoil, through life processes of bacteria, fungi, earthworms, and other soil organisms. Through biological processes, the end products of the organisms of the soil are combined with the mineral elements of the earth to produce the most fertile and productive topsoil known to science. From a practical standpoint, the source materials for biological soil building are inexhaustible. The individual can build

Fig. 1. An organically grown carrot measuring 30 inches (with top) and weighing 6 pounds. Yield was at the rate of 108 tons per acre.

Fig. 2. The author exhibiting his organically grown carrots and parsnips.

Soil

Each individual can build his own "Biological Soil" from available organic wastes, such as garbage and all the residues of vegetable and animal life.

his own soil, working with a single cubic foot of material, or working with hundreds of tons. We have the materials, we have the KNOW HOW, we have the machines, and we have the technical knowledge. It is high time to stop talking about the dead past and a dying world. By utilizing spare time and the cheaply abundant materials which are at hand, each individual can build his own soil and produce his own high quality foods, and thus meet all his nutritional demands and insure his own health and security.

The possibilities for increased food production in all the root and tuberous crops exceed anything ever dreamed of as being possible in ordinary farming and garden practice and in ordinary soil. The same treatment may be made of all food crops including vegetable and tree crops.

The secret of increased food production from biological soil lies in the fact that it may contain FIVE times as much

By Dr. Thomas J. Barrett
of
Earthmaster Farms
Photographs by
Paul E. Wolfe
of Burbank

Fig. 3. A giant parsnip grown in "biological soil" at the rate of 86 tons per acre.

available nitrogen, SEVEN times as much available phosphorus, ELEVEN times as much available potash, THREE times as much available magnesium, and a proportional times as much of the other plant nutrients as ordinary fertile garden or farm soil.

The carrots grown in biological soil at the rate of 106 tons per acre and parsnips at the rate of 86 tons per acre are sweet and juicy, non-fibrous through and through and in every way are of the highest table quality. The carrot shown in the illustration was so crisp that it split open when it accidentally fell to the floor. In the same soil the finest quality Irish (white) potatoes were harvested at the rate of 1200 bushels per acre. Turnips also were grown which weighed as much as 7¼ pounds each.

Registration of Organic Gardening Clubs

It is requested that all Organic Gardening Clubs which have already been organized register by providing the managing editor with the following information:

1. **Name of the club.**
2. **Names of the officers of the club.**
3. **Place and dates of your meetings.**
4. **Activities of your club.**
5. **Names of the members of your club who are qualified and willing to give garden talks and lectures to other clubs.**
6. **Ways in which you feel that the Organic Gardening Magazine and its staff can be helpful to your club.**

We are desirous of having clubs organized in all parts of the country. If there is no organic gardening club in your part of the state, why not organize one immediately? The editorial staff will cooperate with every club and will act as a coordinating body between the clubs. The Organic Gardening Magazine may be regarded as the official organ of the united clubs.

A number of clubs have suggested that each club pay one half of their annual dues to the magazine for such services as slides for garden talks and lectures, lecture outlines for garden talks, copies of foreign magazines that are devoted to the organic methods, a bureau of information, a register of qualified lecturers on garden topics, information on books and government bulletins dealing with organic methods. The editorial staff is willing to assume this responsibility on a non-profit basis. 100% of all dues will be used for the purchase of slides with prepared lectures, the other services mentioned above, and services and helps requested from time to time by the various clubs.

The Soil and Health Foundation

SIR Albert Howard's death puts a big responsibility on *The Soil and Health Foundation.* Sir Albert unquestionably was the father of the organic agricultural movement. To him the world owes a big debt, for it was he who first detected the pathetic fallacy of present day chemical fertilization, and through sheer force of determination spread his philosophy far and wide.

His death thrusts a new urgency upon the infant Soil and Health Foundation, for now we in America must take the lead. To us has fallen the task of finishing what Sir Albert so ably began, fighting to victory a battle against the unnatural methods that are ruining soil and begetting degenerative diseases. Plans are afoot to begin experimental work which will check once and for all the effect of chemical fertilizers on the soil and plant, on man and beast. These will be made by experts with animal feeding and vitamin tests. It is expected that the results will go a long way toward *proving* what we all believe—organic agriculture practiced universally can relieve and eventually cure many of man's degenerative diseases. It can make farming easier. Members of the Foundation will of course be kept fully advised as to results of these experiments. For those who may not have read the announcement of this new Foundation in the November issue, we will repeat the objectives:

(a) To promote, foster and encourage the use of humus and other organic matter in order to maintain and improve soil fertility, to prevent soil erosion and improve the health of man.

(b) To conduct, engage in, foster and encourage scientific research and study and teaching, training, informing and educating the public, on and concerning the soil, foods and health of man—and their relation to each other.

(c) To study the effects of organic and artificial fertilizers on soil, plants, animals and man.

(d) In order to accomplish the foregoing purposes to establish, use, maintain and operate farms, schools, laboratories, experimental stations, publishing houses and all other appropriate agencies, means and instrumentalities.

The name of this new organization is the SOIL AND HEALTH FOUNDATION, with headquarters at 46 South West Street, Allentown, Pa.

Naturally in order to carry out this ambitious yet vitally important program, money will be needed. As this is being written, the November issue carrying the first announcement of the new Foundation is just being mailed. A few proofs of "Page 14" of that issue were mailed out and we were tremendously encouraged by the letters of commendation together with checks which we received by return mail. We hope that when the readers of "Organic Gardening" and their friends hear about this Foundation we will be able to speed up the work that has been planned.

All contributors to the "Soil and Health Foundation" will be *Associate Members.* There will be only one class of membership, with no specified amounts for annual dues. Members may pay as little or as much as they can afford. Members, regardless of the amount of their contributions will receive copies of all bulletins issued by the Foundation, giving the results of the various experiments conducted and other matters of interest. All payments to the Foundation may be deducted on income tax returns.

There can be no question but that active steps must be taken quickly to redirect our agricultural practices to the best interests and health of the people. Modern commercial agriculture has gone off on a dangerous tangent . . . sacrificed healthy quality for quantity. We shall need the help of all intelligent, far-sighted people. Will you help us?

Send your contributions and letters to "Soil and Health Foundation", 46 South West Street, Allentown, Pa.

J. I. RODALE

One of t

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ORGANIC GARDENING WILL SOLVE YOUR GIFT PROBLEM!

From Red Clay to Black Loam in Only Three Years!

Is the Experience of Neil Martin, Pioneer American Organic Gardener of Florence, Alabama.

By HERBERT CLARENCE WHITE
Director, Institute of Country Living
Paradise, California

"THERE is a way which seemeth right unto a man—but the end thereof are the ways of death."

Proverbs 14:12.

According to Neil Martin, this passage of Holy Scripture, taken from the saying of the Wise Man, applies to gardening (as well as a lot of other things). And Neil learned the *hard way!*

Twenty-one years ago, a graduate of the School of Nursing at Madison Sanitarium and Hospital, near Nashville, Tennessee, Neil Martin and his wife set their faces toward the neighboring state to the south. With the immediate spirit of the early pioneers, these young people came to Northern Alabama.

Their goal?—A little Sanitarium, where the sick and the afflicted might get a new hold on life, and obtain a fresh vision of the meaning of the word HEALTH! And Neil believed with all his heart in a strange new theory that somehow the soil was closely and vitally connected with human health. "Health from the ground up" was to become a life-time obsession with this forward-looking young man from Chico, California.

The first step in the fulfillment of this "dream," was the purchase of a rocky knoll on the outskirts of the little city of Florence, with a few acres of rolling countryside adjoining it. The knoll served as a prospective site for the Sanitarium buildings, while the few rolling acres of red clay, intermingled with a generous quantity of gravel, were set aside for garden and farm.

Seldom have I seen less productive-looking soil, or a less attractive garden site. "In the early days, portions of this farm wouldn't even grow weeds," declares Martin. But these young folks were not the kind to become discouraged by mere "handicaps," and with grim determination they set to work to produce food for themselves and for their prospective patients; however, it was an uphill task.

In vain they applied the usual technique for raising crops. In vain they spread on generous quantities of chemical fertilizers to make that stubborn soil produce. In vain they plowed and harrowed and disced and planted! It seemed the more they worked that red clay of theirs, and the more they applied those commercial fertilizers, the worse it got.

Seven heartbreaking years went by. Each year plowing time was delayed a little longer—it was too wet to plow. And when finally the soil was dry

enough to work, it suddenly hardened until it became about the consistency of a cement block! So it was for seven long years—either *too wet* or *too dry*. At no time was the soil friable and easy to work.

During those trying years, few squash, cucumbers, cantaloupes, or other melon crops could be raised on this land. "I couldn't even grow sweet corn!" exclaimed this once discouraged farmer. "Tomatoes, butter beans, pole beans, etc., were planted in succession in order to get them to produce a few for our table during the growing season."

For years it was a matter of *snatching* perhaps a single picking from the vines before the bugs and the beetles, and the fungous and virus diseases snuffed out the fragile life of those anemic and sickly plants.

During those seven years, also, there was a great deal of erosion on that rolling humus depleted land. So, during the sixth year a government agent was called in and a program of terracing was inaugurated. But, according to Martin, the terraces wouldn't hold. With heavy rains the water had a bad habit of "breaking through," and the "wash" from those broken terraces would carry off *more* topsoil and form *deeper* gullies, than even before this precautionary measure had been adopted and put into practice.

Now—after seven years of organic gardening practice—a near miracle has taken place. *One planting* is sufficient for the entire season! "Tomatoes and beans bear from early summer until late in fall," declares Martin with a good deal of justifiable pride. What is more remarkable still—there are no "run-offs"—no broken terraces, no gullies; and during the heaviest downpour there is no water standing anywhere on the farm. Within a short space of time the soil has absorbed every drop of rainfall. From now on *this farm* will make no contribution to our muddy rivers. According to its proud owner, these results were achieved after only three years of organic gardening methods. What has produced these astonishing results? Neil Martin says: "It's HUMUS!"

Seven years ago this American pioneer in organiculture, without the benefit of the O. G. Magazine or other scientific literature, and without the inspiration of Mr. Rodale's editorials on the subject, began to fill his sick, worn-out soil with humus.

In his quest for this "goose that lays the golden egg," Martin visited the city's riding stables. Here he found a good source of horse manure. Added to this was the manure from his own domestic animals—fowls, horses, cows, etc. For vegetable wastes, Martin visited farmers who did not realize or appreciate the value of their straw. Instead of allowing this to be burned, as was the custom in the past, he asked, and was granted the privilege of carting it off in his truck, to add to his stock-pile of plant matter. Cotton wastes from the cotton-seed oil factories were the next on his list. Many tons of this valuable fertilizer were added to his garden land. Before spreading it on the garden, however, in his program of "sheet-composting," Martin used the cotton wastes as bedding-down material in his stable and cow-barn. A heavy layer one foot deep was spread out on the stable floor. As it became soiled, it was hauled off with the animal manures to the cornfield, orchards, or vegetable gardens. Here it was disced into the upper six inches to form topsoil. Sheet-composting is the order of the day on the El Reposo farm.

Another valuable source of mineral-rich organic matter was the city's supply of LEAVES. Up to one hundred truck loads of leaves was not an uncommon yearly average. These were used in a program of leaf mulching, in composting, and some leaves were disced right into the red clay soil as earthworm food, and soon became rich velvety castings.

For garden vegetables Martin's procedure is worthy of more than passing notice. It consists of the following steps: the opening of a trench with the Lister plow; filling the trench with

partially decomposed compost; planting the seed; covering the seeds to the proper depth with a layer of finished compost—presto! an enviable crop of carrots, beets, spinach, radishes, lettuce, onions, and other fine vegetables!

During the years since the principles of organiculture were adopted on this farm, there has been a steady improvement in both quantity and quality of the crops grown. The flavor and texture are something "to write home about." Leaves that in former years were yellow, now are a dark, glossy green. There are some insects—but NO crop failures. Plant diseases have vanished—"at least they are not visible to the naked eye," says Martin. At any rate, if there is disease present, it hasn't affected the crops—which from all outward appearances, are TOPS!

"We had a bad time when we started to *convert* to the organic system," Martin recalls. "I took my stand against *pest controls* eight years ago. For three years I lost most of my crops. Everything was eaten up! Now, NOTHING is eaten up! As the humus in the soil increased, and the earthworms multiplied, the health and vigor of my crops increased. With the *transformation of the soil* there came a transformation also in the products of my farm. The second year after starting the organic gardening program, you will have results—both in quality of the product, and in the plant's resistance to disease."

Another factor that will interest organic gardeners is the apparent resistance or organically grown plants to cold. "It seems to us," Martin asserted, "that our fall and winter crops stand from 5 to 10 degrees lower temperature than they did before we adopted this method of farming." Further experiments should be worked out on the basis of this observation. Certainly Neil Martin's experience is a challenge to research and experimentation on this matter of resistance to cold.

Of the ability of his crops to withstand heat and drought—that is a subject worthy of a story all by itself. Perhaps some day we shall tell that story.

A high-spot in our visit to this remarkable little farm was when Martin took us to the potato patch, where he astonished us no end by digging his potatoes—not with a shovel, not with a spading fork—but with his bare fingers! In the good old days when chemical fertilizers were "the order of the day," he could hardly perform this operation with a pick ax!

Word has just come from Martin that eleven sweet potatoes from this patch filled a bushel basket and weighed 50 pounds! One of these big fellows weighed 10¼ pounds. "It's the largest sweet potato I ever saw" he writes.

Another thrill came to us when Martin took two handfuls of soil—one from the still untreated portion of his farm; the other from his humus-filled vegetable garden. I wish you could see the kodachrome I took of these two specimens of soil! One handful is red clay, hard as a brick bat—the other black loam, soft and velvety in texture. Hence the title of this story —"From Red Clay to Black Loam in Only Three Years!"

In conclusion, may I refer you, dear reader, back to our beginning text: "There is a way which seemeth right unto man"—the popular way—the easy way—the accepted way—the so-called "scientific" way—but to Neil Martin, that way, *in his garden* at least, was the way of DEATH!

Vest-Pocket Vegetable Guide, 25 cents. **Manual of Organic Materials**, 35 cents. Order from Organic Gardening, Dept. Z-1, Emmaus, Pa.

Anemone **Clewell**

Rue Anemone — Anemonella Thalictroides

By DR. WILLIAM H. EYSTER

(EDITOR'S NOTE:—One or more plants from Nature's flower garden will be presented in each issue of this magazine.)

THE rue anemone is as bold as it is dainty. The plant awakes from its winter sleep, grows rapidly, and puts forth its flowers early in April in woodlands that still have the appearance of winter. There is no greater pleasure than walking through the dry leaves which mulch the woodland plants and finding so delicate a plant in full leaf and flower so early in the spring. One wonders why this little woodland plant grows so rapidly and unfolds its flowers so very early in the new growing season. The answer to this question is suggested by the young fern in the illustration which is extending its leaves far above those of the rue anemone and eventually will play a part in screening the light so that later in the season relatively little light will reach the lowly anemone. This means that the anemone must grow and reproduce while the sun shines and complete its annual growth before the larger plants shut out the light which is the source of energy for all green plants.

Rue anemone belongs to the buttercup family, also known as the crowfoot family because the leaves of all members of this family are three-lobed, -parted, -divided, or -compounded and thus resemble the three-toed foot of a crow. Although the crowfoot is a large plant family, this leaf characteristic makes it possible to easily identify plants belonging to it. You will see what I mean if you examine the leaves of clematis, columbine, buttercup, peony, meadow rue, delphinium, marsh marigold, and hepatica which are common members of this family.

The flowers of rue anemone are pure white or white with a blush of pink and occur in small clusters borne on slender pedicels. Do not pick these flowers because they will wilt and die in your hands. They can be transplanted to your wild flower garden if you are careful to dig deep enough to get the complete root system including the cluster of fleshy tuberous roots which represent the plant's store of food reserves. This plant seems to have a passion for the number three. Usually there are three tuberous roots, three leaflets to each leaf, three lobes to each leaflet, three flowers in each cluster, and six leaves in a whorl about the flowers. But outward appearances in plants as in people do not always reveal what is innermost. Examine the flower of rue anemone and you will find that it has from 5 to 10 sepals, no petals, and an indefinite number of stamens and pistils. This apparent inward confusion is but an expression of evolutionary plasticity. The pistils which are pollinated will ripen into one-seeded dry fruits called achenes. After the flowers ripen their seeds, the leaves continue to build up food but at an ever decreasing rate until the process ceases altogether as the tuberous roots are replenished with reserve foods and the light is shut off by the overgrowing plants.

The rue anemone's plant neighbors, as shown in the illustration, are such plants as ferns and wood oxalis. The fern plant in the illustration is rapidly outgrowing the anemone which will play a part in shutting out its light. The oxalis plant can be identified by its three-foliate, shamrock-like leaves.

Botany For The Gardener

By Dr. William H. Eyster

A General Survey of the Plant Kingdom

(Editor's Note:—This is the second in a series of articles on Plant Life.)

ALL the plant inhabitants of the earth constitute the Plant Kingdom. All animals, on the other hand, make up the Animal Kingdom. The study of plants is called botany, while the study of animals is called zoology. Botany and zoology together constitute the field of learning known as biology. A student of botany must also to a certain extent be a student of zoology because plants and animals live together in the most varied relationships and often are quite interdependent. There are many striking differences between the highest type of plant, as sunflower or orchid, and the highest type of animal, as man; but as we pass from the highest to the lowest plants and animals, the differences between them gradually disappear so that it is not always easy to differentiate the simplest organisms into plants and animals respectively. As a matter of fact, some of the very simplest organisms have the characteristics of both plants and animals. An example of this type of organisms is the euglena, illustrated in Fig. 2, which has the chloroplastids of a plant and the food gullet and flagellum of an animal.

If you put a pinch of soil or dead vegetable matter in water in a glass jar and allow it to stand in a warm place for a few days, the water will become populated with many kinds of microorganisms. If you examine the water by holding the culture up toward a source of light you can just barely see some of the largest of them. If you examine a drop of the water from this culture under a microscope, you will observe both plants and animals moving about in the water with great activity. The most striking and important difference between them is that the plants contain chlorophyll and do not take solid food into their body while the animals lack chlorophyll and take living or dead plant and animal matter into their body as foods. Accordingly, the organisms which appear green are plants, while those which are more or less colorless are animals. At this point it must be mentioned, however, that a few kinds of plants as bacteria and fungi lack chlorophyll and are colorless but differ from animals in that they do not have a food gullet and do not take solid foods into their body. Bacteria, fungi, and other colorless plants secrete enzymes to digest their foods which are then absorbed through the general body wall.

A Comparison Between Plants and Animals

It is generally believed by all that the higher and more complex plants and animals have developed from more simple ancestors. This concept of the origin of the higher from lower and more primitive forms of life is known as *organic evolution.* Students of living organisms, i.e. biologists, soon learn that organisms are not constant and fixed in their characteristics, but are variable and in the course of time undergo profound changes. The evidences whch are at present available in the form of living, dead, and fossilized plant and animal bodies indicate that 1) the first organisms to appear upon the earth were microscopically small and were not differentiated into plants and animals, 2) some retained their chlorophyll and developed into more and more highly differentiated plants, and 3) some lost their chlorophyll and developed organs

for taking solid foods into the body and in addition organs of sense perception and organs of locomotion to enable them to find their daily bread. The common origin and divergent evolution of plants and animals may be represented graphically by a large tree in the form of a Y. The trunk of this tree represents the plant-animal ancestors of plants and animals, while the two main branches represent the plant and animal kingdoms respectively. The smaller branches of each of these main branches represent the *divisions, classes, orders, families, genera,* and *species* of the plant and animal kingdoms respectively.

Although the higher plants and animals are strikingly different in appearance and in modes of life, they have many characteristics in common. This is to be expected in view of their common origin. Some of the more common likenesses between plants and animals are: 1) they are made up of protoplasm which is organized into structural and functional units called *cells;* 2) they carry on similar metabolic processes as digestion, translocation, assimilation, and respiration; 3) they grow by cell division, cell enlargement, and cell differentiation; 4) they reproduce similarly by asexual and sexual processes; 5) they transmit according to the same laws, characteristics from parents to offspring; and 6) the higher forms live as individuals for a limited span of life and then die and their bodies are dismantled piece by piece by the organisms of decay in much the same way as an obsolete building is taken apart by a wrecking crew. Some special fields of biology which deal with both plants and animals are general physiology; genetics, the study of heredity; cytology, the study of the cell; and organic evolution, the study of the origin of organisms.

It is somewhat more difficult to point out fundamental differences between plants and animals than it is to state their likenesses. The following comparison is an attempt to do this.

Plants	*Animals*
1. Green plants, as if by magic, can convert water and carbon dioxide (a gas exhaled by animals) into sugars and starches. This process is called *photosynthesis* and can take place only in the presence of light. Non-green plants, as bacteria and fungi, are dependent upon green plants for foods.	1. Animals lack chlorophyll and are entirely dependent upon green plants for their energy-containing foods. If all green plants were destroyed, all animal life would promptly disappear from the earth as living organisms.
2. Plants do not have a digestive tract for the taking into and digesting foods in their bodies.	2. All animals have a digestive tract with specialized organs for apprehending and capturing foods, organs of locomotion, and organs for excreting indigestible residues and the waste products of metabolism.
3. Plant cells have a rigid cell wall composed of celluloses and lignins, and usually are the most important part, structurally, of the plant body.	3. Animal cells have a plastic membranous wall composed of protein substances.
4. The bodies of the higher plants include many dead cells which, nonetheless, perform important functions as support of the plant and conduction of water and minerals through the plant body.	4. Animal bodies are made up almost exclusively of living cells.

Plants	*Animals*
5. In all but the simplest plants, growth is localized in certain regions as tips of stems and roots.	5. Growth, although not at the same rates, takes place in all parts of the animal body and is not restricted to certain regions.
6. Growth in plant bodies is indefinite, i.e., it continues during the entire life of the plant.	6. Growth in animal bodies is definite and ceases when the animal reaches maturity.
7. Only the simplest plant bodies, as bacteria and fungi, have organs of locomotion and thus are able to move from place to place. In the higher plants, locomotion is limited to the sex cells, and particularly to the male sex cells.	7. As simple animals evolved into more complex ones, more and more highly specialized organs developed until the highest animals move through all possible media as soil, on the surface of the soil, in water, on the water, in the air, and in the bodies of other organisms.

What is a Plant?

Now that we have made a comparison of plants and animals and realize that they coexist in our environment, we should try to get a rather clear idea of what is meant by the word *plant*. It is without doubt a very general term, as it includes the bacteria which are so small that it takes 25,000 of them placed end to end to measure an inch. It includes the yeasts which ferment our wines and raise our bread dough. It includes algae from the microscopically small *pleurococcus* which gives the green color to the north exposure of fences and trees, the algae in the pond, to the giant kelps of the sea. It includes the fungi which are ready to grow wherever there is organic matter and the environmental conditions are favorable. And finally, as we all know, the word plant is applied to all herbs, shrubs, and trees that are so familiar to us. The giant Redwood trees of the Pacific coast are not only the largest but also the oldest living organisms on the earth today. There are also trees in Mexico which are as old or even older. The wide structural and functional differences of the plants which make up the plant kingdom are the result primarily of genetic differences inherent in the plants themselves, and secondarily of differences in the environmental conditions under which the plants are living.

Fossils Tell the Story of Plant Evolution

An imprint or a metamorphosed plant or part of a plant in the rocks is called a *fossil*. The rocks of the earth's crust contain fossils of many kinds of plants and animals, some of which became extinct long ago. In recent years much has been said about the origin and evolution of individuals, varieties, species, genera, and higher categories of plants and animals. The only really accurate evidences we have of the plants and animals which lived in earlier geological ages are the fossilized remains which occur in the different strata of sedimentary rocks. It is reasonable to suppose that the plants which occur as fossils in a rock stratum existed upon the earth at the time the particular rock stratum was deposited. By regarding the superposed rock strata as leaves in a giant book of the past, and by considering the fossils as direct evidences of the kinds of plants and animals that lived in the era represented by each rock stratum, a general story of the evolution of plants and animals can be deciphered.

In the oldest and lowermost rock stratum, which represents the first chapter in nature's great book on the history of the earth, are fossil remains of only the simplest and most primitive kinds of organisms. These fossils tell us more clearly than words that the first living things on the earth consisted exculsively of the most elementary types of organisms. As we pass from the lowermost through successive overlying strata of rocks in much the same way as we leaf through the pages of a book, we find fossils of plants that gradually become more and more complex. This is evidence that in succeeding geological eras the plants increased in complexity until they reached their highest development in the seed plants which now constitute the dominant flora of the earth. From these fossil remains we learn that various algae flourished in the waters of the earth during the Cambrian Period of the Paleozoic Era, and undoubtedly existed long before that time. In the course of the next hundred million years, land plants in the form of the *pteridophytes* (fern plants) and gymnosperns (conifers) were evolved, the former reaching their zenith in the Lower Carboniferous Period and the latter in the Upper Carboniferous Period of the same era. Since then, the pteridophytes and gymnosperms have waned and largely have disappeared from the earth, so that today only remnants of those ancient and once dominant floras remain.

More recently the angiosperms (flowering plants) have evolved and now constitute the dominant flora of the earth. Accordingly, the plant kingdom as at present constituted, is made up of the angisperms and of such representatives of the ancient and more primitive plant groups as have been able to adjust themselves to the changing conditions on the earth and to survive to the present time. The plants which now inhabit the earth are divided into the following four great divisions: 1) Thallophytes, algae and fungi; 2) Bryophytes, the liverworts and mosses; 3) Pteridophytes, ferns, club-mosses, horsetails, and quillworts; and 4) Spermatophytes or seed plants including the gymnosperms (conifers), and angiosperms (flower-bearing plants). Each of these divisions of the plant kingdom is further divided into classes, orders, families, genera, and species. Furthermore, each species is made up of individuals which may be grouped into subspecies, varieties, races, strains, and pure lines.

Thallophytes — Thallus Plants

The thallophytes, or thallus plants, are the simplest kinds of plants whose bodies are not differentiated into such organs as roots, stems, and leaves. These simple plants always live in a liquid or solid medium as water, moist soil or other surface, or the body of another organism. They represent our most ancient, and structurally most simple, plants; and vary in size, in activities, and in methods of reproduction. The thallus plantts are arbitrarily called *algae* if they possess chlorophyll and are capable of carrying on photosynthesis, and *fungi* if they lack chlorophyll and consequently are forced to take their foods from living plants and animals, or from the dead remains of plant and animal bodies.

The Blue-Green Algae

These algae are so widely distributed throughout our environment that we might well call them the *universal algae*. They contain a blue pigment (phycocyanin) and a red pigment (phycoerythrin) in addition to the regular chloroplastid pigments so that they vary in color depending upon the amount and kind of light in which they are observed. The blue and red supplementary pigments enable these algae to adapt themselves to different light qualities. When they are exopsed to red light, they appear green; in green light, they appear red; and in yellow light, they appear blue-green. That is, they assume the color that is

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Fossils Tell the Story of Plant Evolution

An imprint or a metamorphosed plant or part of a plant in the rocks is called a *fossil*. The rocks of the earth must contain fossils of many kinds of plants and animals, some of which became extinct long ago. In recent years much has been said about the origin and evolution of individuals, varieties, species, genera, and higher categories of plants and animals. The only really accurate evidences we have of the plants and animals which lived in earlier geological ages are the fossilized remains which occur in the different strata of sedimentary rocks. It is reasonable to suppose that the plants which occur as fossils in a rock stratum existed upon the earth at the time the particular rock stratum was deposited. By regarding the superposed rock strata as leaves in a giant book of the past, and by considering the fossils as direct evidences of the kinds of plants and animals that lived in the era represented by each rock stratum, a general story of the evolution of plants and animals can be deciphered.

In the oldest and lowermost rock stratum, which represents the first chapter in nature's great book on the history of the earth, are fossil remains of only the simplest and most primitive kinds of organisms. These fossils tell us more clearly than words that the first living things on the earth consisted exculsively of the most elementary types of organisms. As we pass from the lowermost through successive overlying strata of rocks in much the same way as we leaf through the pages of a book, we find fossils of plants that gradually become more and more complex. This is evidence that in succeeding geological eras the plants increased in complexity until they reached their highest development in the seed plants which now constitute the dominant flora of the earth. From these fossil remains we learn that various algae flourished in the waters of the earth during the Cambrian Period of the Paleozoic Era, and undoubtedly existed long before that time. In the course of the next hundred million years, land plants in the form of the *pteridophytes* (fern plants) and gymnosperns (conifers) were evolved, the former reaching their zenith in the Lower Carboniferous Period and the latter in the Upper Carboniferous Period of the same era. Since then, the pteridophytes and gymnosperms have waned and largely have disappeared from the earth, so that today only remnants of those ancient and once dominant floras remain.

More recently the angiosperms (flowering plants) have evolved and now constitute the dominant flora of the earth. Accordingly, the plant kingdom as at present constituted, is made up of the angisperms and of such representatives of the ancient and more primitive plant groups as have been able to adjust themselves to the changing conditions on the earth and to survive to the present time. The plants which now inhabit the earth are divided into the following four great divisions: 1) Thallophytes, algae and fungi; 2) Bryophytes, the liverworts and mosses; 3) Pteridophytes, ferns, club-mosses, horsetails, and quillworts; and 4) Spermatophytes or seed plants including the gymnosperms (conifers), and angiosperms (flower-bearing plants). Each of these divisions of the plant kingdom is further divided into classes, orders, families, genera, and species. Furthermore, each species is made up of individuals which may be grouped into subspecies, varieties, races, strains, and pure lines.

Thallophytes — Thallus Plants

The thallophytes, or thallus plants, are the simplest kinds of plants whose bodies are not differentiated into such organs as roots, stems, and leaves. These simple plants always live in a liquid or solid medium as water, moist soil or other surface, or the body of another organism. They represent our most ancient, and structurally most simple, plants; and vary in size, in activities, and in methods of reproduction. The thallus plantts are arbitrarily called *algae* if they possess chlorophyll and are capable of carrying on photosynthesis, and *fungi* if they lack chlorophyll and consequently are forced to take their foods from living plants and animals, or from the dead remains of plant and animal bodies.

The Blue-Green Algae

These algae are so widely distributed throughout our environment that we might well call them the *universal algae*. They contain a blue pigment (phycocyanin) and a red pigment (phycoerythrin) in addition to the regular chloroplastid pigments so that they vary in color depending upon the amount and kind of light in which they are observed. The blue and red supplementary pigments enable these algae to adapt themselves to different light qualities. When they are exopsed to red light, they appear green; in green light, they appear red; and in yellow light, they appear blue-green. That is, they assume the color that is

complementary to the color of the light in which they are observed. This complementary color adaptation is brought about by varying the proportions of the blue and red pigments, and enables the blue-green algae to live in many kinds of habitats, as in deep waters where the light that reaches them has a high content of green wave lengths, and on soil beneath other plants where some of the wave lengths of the light have been filtered out.

In ordinary daylight, blue-green algae have the appearance of a blue-green, oily coating and can be seen on almost any moist, poorly lighted surface as on soil in moist field and woods, on the soil and pots in greenhouses, and in watering places where it occurs as large clumps of algal material. These algae live under the most varied conditions, from the almost boiling waters of the hot springs to the frozen soils of winter. Their world-wide distribution and their ability to withstand extreme variations in temperature, moisture, and other

ALGAE OF THE SOIL

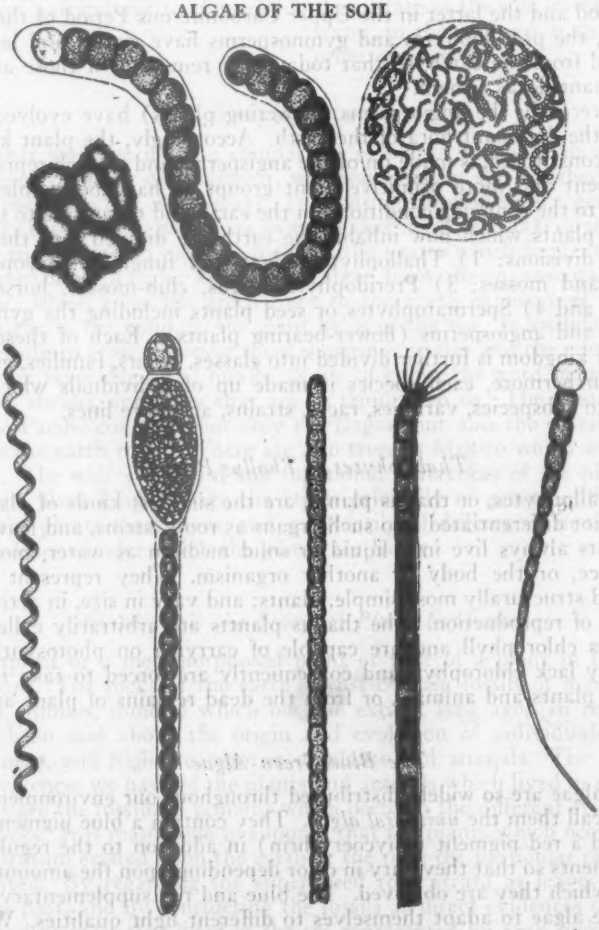
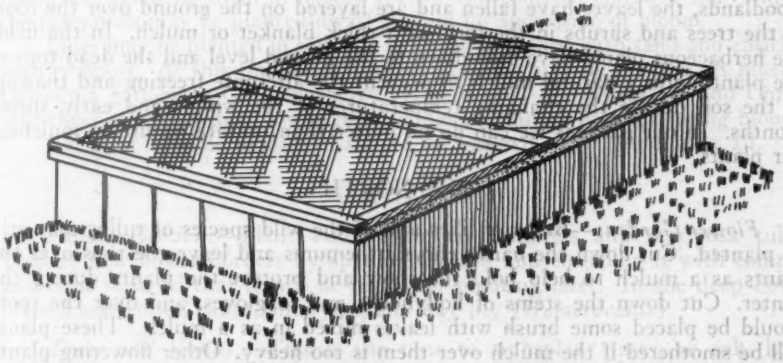


FIG. 1 BLUE GREEN ALGAE

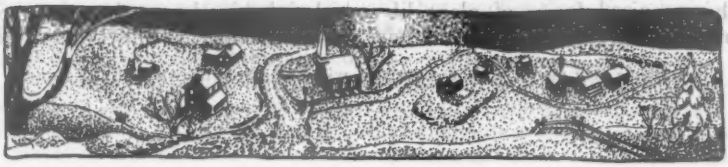
environmental conditions, and the simplicity of their cell structure make it appear probable that these algae are the direct descendants of the forms of life which existed upon the earth before the conditions became suitable for the more highly organized forms of plant life which inhabit the earth today. Some common blue-green algae, as seen under the microscope, are illustrated in Fig. 1.

(The article next month will be concerned with the green, brown and red algae.)



RODENT PROOF COMPOST PIT

This garden gadget is a rodent-proof compost pit which can easily be constructed by any gardener. Dig a hole of the dimensions the pit is to have and two feet deep. Fit a piece of wire netting (hareware cloth) in the bottom of the pit to prevent rodents from digging into the pit from below. Line the sides with tiling which should extend a foot or more above the level of the ground. Now fit wire screening across the top to exclude rodents from that approach. The pit may be made in the form of a twin, as shown in the illustration, so that the compost heap may be started in one side. Then after three weeks, the heap is turned by transferring the material to the other side of the pit. After five weeks more when the heap is ready for the second turning, the compost is returned to the side in which it was originally made where it will remain until it is finished. After the second turning, a new compost heap may be started in the empty side of the pit at such time that the finished compost will be ready to be taken out by the time the new heap is ready for its first turning. If the heap in the pit is properly moistened and aerated, it will be free from odor at all times. This gadget can be an attractive structure in the back yard, especially if tied into the backyard by suitable landscape plantings.



Garden Calendar — December

December is the month for finally tucking the plants in for winter. The garden theme for the month may be expressed by the word, *mulching*. In the woodlands, the leaves have fallen and are layered on the ground over the roots of the trees and shrubs in the form of a thick blanket or mulch. In the fields the herbaceous plants have died down to the ground level and the dead tops of the plants form a natural mulch to prevent the alternate freezing and thawing of the soil during the changing temperatures of the winter and early spring months. In our gardens we can do no better than imitate nature in mulching our plants.

THE NORTH

Flower Garden:—Bulbs of lilies and of the wild species of tulips may still be planted. Cut down the hardy chrysanthemums and leave the tops over the plants as a mulch to help hold the snow and protect the plants during the winter. Cut down the stems of hollyhocks and foxgloves, and over the roots should be placed some brush with leaves mixed in as a mulch. These plants will be smothered if the mulch over them is too heavy. Other flowering plants which prefer a light rather than a heavy mulch are the irises, coreopsis, daisies, pinks, and primroses. Net your tree peonies with wire and cover them with leaves for winter. Prepare your excess flower seeds, collected from your own flower garden and from your choicest plants, for Christmas gifts by putting them up in neat and colorful seed packets. Your friends will appreciate choice seeds more than almost anything else you might give them. It is a remembrance that lasts through the year.

Vegetable Garden:—Be sure that all dead plants have been removed from the vegetable garden and put into the compost heap. This simple sanitary measure goes a long way toward the control of diseases in the vegetable garden. Far more attractive also is a neat, orderly garden seeded in winter rye than one having half frozen vegetables of various kinds lying about in a disorderly fashion. Many of the garden insects hibernate in garden wastes. Why allow these pests to spend the winter in your garden?

Shrubs and Trees:—Shrubs and trees may be pruned safely providing the branches are not frozen. Among those that may be pruned at this time are climbing roses, honeysuckle, lilac, and mock orange. Tender shrubs, as box-wood and daphne should be protected by erecting a light wood frame, to be covered later with burlap. Evergreens that need triming should be trimmed about two weeks before Christmas, and the trimmings should be saved for

Christmas decorations. These trimmings should be kept in a cool, dark place and sprinkled occasionally. By this conditioning process, the leaves and fruits will remain on the evergreen branches longer than if they are taken directly from the tree at Christmas time. Fruit trees should be protected from rabbits and field mice by placing hardware cloth around the stem. The old canes of blackberries and raspberries should be cut out if this has not already been done. Newly planted trees should be anchored against the winter winds. After the ground is frozen, all trees will be benefited by a suitable mulch. Before the ground freezes, mulch the rhododendrons, azaleas, and newly planted conifers after having given them a thorough appilcation of water.

Mulching:—Strawberry beds, perennial beds, and all other plants not specifically mentioned above should be mulched just as soon as the ground is frozen. This will prevent the alternate freezing and thawing of the ground which is so harmful to plants.

THE WEST COAST

The perennial border may be renewed by taking up the plants, separating them, and resetting them in freshly spaded and compost-enriched soil. Among the perennials may be planted dwarf gladioli for succession of bloom.

Lilies may be planted in soil that has been lightened with sand and enriched with compost. At this time also Montbretia bulbs may be planted. A must in California gardens is Christmasberry (*Heteromeles arbutifolia*) to add Christmas cheer to the garden. Sweet peas should be planted now for spring bloom.

Cacti are now dormant and should be watered seldom or not at all.

THE SOUTH

Flower Garden:—Plant bulbs such as fritillarias and mariposa tulips. Prepare new flower borders by spading the soil and enriching it with compost and bone meal so that it will be ready for planting later. In the deep South, plant Easter lilies, callas, amaryllis, and day lily (*Hemerocallis*).

Trees and shrubs:—This is the time to transplant trees, as oak, holly, ginkgo, and tulip tree. Shrubs which produce their flowers on current season's growth may be pruned at this time. This also is the best time to transplant roses, hydrangeas, holly, and oleanders. Various shrubs and vines may be propagated by layering throughout the winter months. Also cuttings may be made and placed in a trench out of doors for rooting. By spring they will have rooted and may be planted out in rows in the garden or nursery. Azaleas should be kept well watered during the winter.

Vegetable Garden:—Set out asparagus, rhubarb, cabbage, and strawberry plants. This also is the time to plant seeds of many vegetables. Refer to your Agricultural Experiment Station bulletins or get a copy of our garden calendar which will soon be ready for distribution.

House and Greenhouse Gardening, 35 cents. **Complete Modern Garden Herbal**, 40 cents. Order from Organic Gardening, Dept. Z-1, Emmaus, Pa.

On The Organic Front

By DR. WILLIAM H. EYSTER

ORGANIC DIRECTORY

Mrs. Judy Smith of Llano, California has conceived the idea of compiling a directory carrying the names of all organic gardeners whom she has been able to contact during the past few months and who either have organically grown foods for sale or to give to their friends. This directory will enable all who are interested to contact gardeners and farmers who grow foods organically on a private or commercial scale.

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The Medical Society of Cambria County, Pennsylvania distributed, as an insert in their program, to their membership consisting of approximately 300 doctors the booklet "Are Chemical Fertilizers Ruining our Soil and Our Health?" Reprinted in the program also was an article from the August 1947 Organic Gardening Magazine by Herbert Clarence White entitled "Can we Learn From China?"

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PARKING LOTS FOR GUANO BIRDS

According to a recent issue of SCIENCE Director Carlos Llosa Belaunde of the semi-official Compañia Administradora del Guano fondly examined a sample of guano on Peru's rainless guano covered Chincha Islands. On this island are some 20 million birds which are producing fertilizer for Peru's irrigated fields. According to a recent report Señor Llosa expects this year's output of his "fertilizer factory" to be approximately 170,000 tons, more than double of what it was in 1942. This increase in yield is attributed to Senior Llosa's pampering of the birds and to the Peruvian Current which was flowing strong and cold from the Antarctic and greatly enriching the sea off Peru with marine life, the natural foods of the guano birds.

The most important of the guano birds is the *guanay*, a kind of cormorant, which is highly skilful in catching the fish that swarm in Peruvian waters and converting them into natural fertilizer. Each bird eats about 60 small fish each day and deposits annually some 10 pounds of guano. Captains of ships are asked not to blow their whistles when passing the Chincha Islands lest the birds take off and deposit the fertilizer in the sea. Also the birds have the habit of dragging their tail when they first take off, and their tail feathers brush the guano off the cliffs into the sea. To prevent this loss, Señor Llosa is building walls around the edges of the islands to force the birds to gain altitude more quickly.

The Islands are so thickly populated that they need more space. The climate of southern Peru is favorable for the birds, the sea is full of fish, and when the birds take up life on the mainland, foxes eat their eggs. To outwit the foxes, Señor Llosa is building ten-foot walls across the peninsula, thus making artificial islands for the birds to use as bases and breeding grounds. He may even build floating islands out in the sea to accomodate his unique fertilizer factory.

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ORGANICALLY GROWN FOODS

In the April, 1946 number of the Farm Journal, Mr. M. T. Rose believes that within a few years an enlightened public will refuse to use as foods the unwholesome and dangerous foods farmers now are producing.

In explanation of the above statement, Mr. Rose points out that he means animals that are inseminated by artificial methods, grown and fattened on artificial feeds, and made more tender and meaty by hormones. He includes also milk from cows pastured on chemically-contaminated meadows, and fed artificially vitamin-spiked feeds; eggs that contain little value except the eggshell; chickens that are closely confined in batteries of small exercise-prohibiting cages and fed or even stuffed with specially compounded artificial mashes; bread made from wheat that contains nothing but what he gets from the fertilizer factory; and fruits and vegetables bearing the limits of arsenicals and other poisons.

There are certain farm groups and individual farmers now marketing organically grown grains and other foods and getting a premium for them. It will spread like wildfire as soon as the city publicity hounds find that it makes salable reading.

START COMPOST PILE TO SECURE SUPPLY FOR CITY PARKS, LAWNS

According to a recent issue of the Allentown, Pennsylvania Morning Call, the Bureau of Parks of Allentown is now preparing a giant compost pile at Trexler Memorial Park. The park superintendent was to be assured of an adequate supply of compost for spring planting. When completed the pile will contain an estimated 700 tons of materials. It will measure about 18 feet by 100 feet and 5½ feet high.

The Lehigh County Agricultural Society has supplied the city with all straw manure collected from the fair grounds during the past three years; dead animals; 100 tons of manure produced by farmers, and about 200 tons of soil. The materials will decay during the next six months and will supply excellent top soil for the greenhouses, lawns, the rose garden, old fashioned garden, and flower beds throughout the park system.

Join Our Garden Seminar

Share your organic gardening successes by telling your fellow Organic Gardening readers what methods and procedures give you the greatest satisfaction and pleasures. All are interested to know what garden plants you grow and why, what special methods you have found to be most effective, what have been your greatest garden triumphs, how your plants respond to compost, how you protect your plants from diseases and insect pests, how you use your plants for decorative purposes, in fact anything and everything that has made some aspect of your gardening outstanding.

The Editorial Staff invites you to prepare a carefully written article of from 300 to 750 or 1,000 words on any of the topics listed below, or on any topic of your own choice:

1. **My favorite garden annual.**
2. **How I succeed without chemical fertilizers and sprays.**
3. **How I plan my flower garden.**
4. **How I maintain a colorful garden all summer.**
5. **My favorite flowering shrub.**
6. **Any topic of your own choice.**

You need not be a professional writer to take an active part in this garden seminar. We want you to tell us about your most outstanding garden achievement. The articles which, in the opinion of the editors, are best will be published in the Organic Gardening Magazine, and the articles will be paid for at our regular rates to contributors. We want you to feel that the Organic Gardening Magazine is yours. We desire more contributions from our readers. Send your article addressed to the Editorial Staff, Organic Gardening, Emmaus, Pa.

Fenugrek

By JOHN C. GIFFORD

MY knowledge of fenugrek is based on the following and although I have hunted high and low I have found nothing but divergence of opinion and no picture anywhere of the plant in my botany books. Years ago while on the North coast of Africa I saw a small field of it. It reminded me of a very vigorous growth of cowpeas but the bean pods were slender; each with a long beak.

My French friend, a forester, told me there was a tribe of Semites nearby who would never marry till they could find a woman weighing two hundred and twenty-five pounds or more and that the slim ones ate fenugrek to increase their bulk also to maintain it.

Later on I met a skinny fellow on the boat who had a pain in his back. A Greek doctor diagnosed his complaint as a "floating kidney" and told him to eat fenugrek flour to form pads of fat to hold his internal organs in place. Years later I met a French doctor who had charge of a tuberculosis sanitorium in Western France. He said he fed his patients on plenty of meat, milk and eggs with a spoonful of fenugrek flour each day because he said tuberculosis patients seldom die while fat.

The M. S. Department of Commerce informed me some years ago that fenugrek was sparingly grown in this country, just where I have never heard, and that we import about half a million pounds of fenugrek seeds a year.

Among my books I pick up first MacMillan's "Tropical Planting and Gardening". He is usually correct but he puts it in the Umbelliferae instead of the bean family where it belongs. He describes it as "an annual largely grown in India for the small grain-like aromatic fruits which are largely used as a condiment and in curry stuffs; they are also used in medicine and yield a yellow dye". He must refer to the same plant since he gives it the right scientific name (Trigonella faenum-graecum), trigonella meaning "little triangle" probably so named from the shape of the flower.

I look in Webster's Dictionary which says "fenugrek or Greek hay cultivated for its strong-smelling seeds" and quotes J. Smith from his "Popular Names of Plants" as "Now only used for giving false importance to horse medicine and damaged hay." Just what it does to damaged hay is unknown to me.

Then I refer to "Economic Botany" by Albert F. Hill of Harvard University and fare much better. He is usually right in his facts and conclusions. He says "fenugrek is an annual legume with white flowers and long slender pods with a pronounced beak. It is a native of Southern Europe and Asia. The plant is grown for forage and for ornamental purposes. The small seeds are used in India for curries, in dyeing with other aromatic substances, and in medicine. The extract is used for making an artificial maple flavoring."

It is well to note that he says it is

used for "ornamental purposes" and in "maple" flavoring. Being a tough ornamental annual of the bean family it should be used in flower beds although I have never seen it.

In Bailey's Cyclopedia of Horticulture there is a good article on fenugrek by M. G. Kains from which I quote as follows: "Fenugrek is an erect little-branched plant with three-foliolate leaves. The seeds are one to two lines long, brownish yellow and marked with an oblique furrow half their length. They emit a peculiar odor and contain starch, mucilage, a bitter extractive, a yellow coloring matter and six per cent of fixed and volatile oils. As human food they are used in Egypt mixed with wheat flour to make bread; in India, with other condiments to make curry powder; in Greece, either boiled or raw, as an addition to honey; in many oriental countries to give plumpness to the female human form. The plant is used as an esculent in Hindustan; as an early fodder in Egypt, Algiers, France and other countries bordering on the Mediterranean. Formerly the seed was valued in medicine now it is employed only in the preparation of emollient cataplasms, eremata, ointments and plasters, never internally. In veterinary practice it is still esteemed for poultices, condition powders, as a vehicle for drugs and to diminish the nauseating and griping effects of purgatives. It is commonly used by hostlers to produce glossy coats upon their horses and to give a temporary fire and vigor; by stackmen to excite thirst and digestion in fattening animals, by manufacturers of patent stock feeds as a "flavoring ingredient".

O. W. Barrett in "The Tropical Crops" says "fenugrek is an alfalfa-like plant of South Asia and Northeast Africa. In Abyssinia it is cultivated for fodder. The ill-smelling seed is very fattening, about 22% protein."

Edmond Szekely in his "Cosmos Man and Society" speaks highly of fenugrek as a medicine.

It is safe to say that a plant cultivated so long in the East has countless legends connected with it. The fact that it stays green in times of drought better than other fodders is something that ought to recommend it for flower beds and roadsides. One author states that fenugrek flour is a common article of trade in Southern Europe. I have found no seed for sale in any of our seed stores.

In short it is evident that fenugrek stimulates the appetite, increases fat production also reproduction. It no doubt enters into a lot of things which we use without knowing. The amount imported indicates an extensive use.

It seems worthy of careful study. It is no doubt fattening and stimulating and nowhere have I seen any mention of deleterious effects from the use of it.

Maybe we are missing something worthwhile in neglecting this time-honored legume.

Quick-Return Method of Compost-Making, 50 cents. **House Plants—How To Grow Them**, 50 cents. Order from Organic Gardening, Dept. Z-1, Emmaus, Pa.

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A SECOND LOOK

The scientific rules for natural enrichment of impoverished soil

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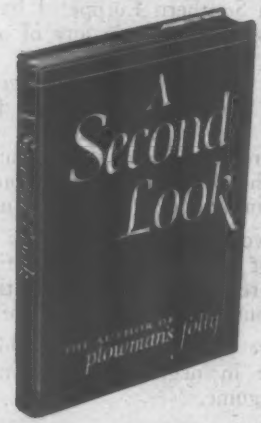

Faulkner not only discusses his theory at length but gives actual case histories of its application which anyone can apply to his own soil problems.

He tells how Southern farmers, using green manure on a sandy soil, produce 50 to 100 bushels of corn where 10 grew before. He describes his own experience in bringing back a patchy lawn to a verdant green. He writes of a victory gardener in Ohio, who, using Faulkner's methods of plowless farming, green manure, and level cultivation throughout the year, greatly improved his entire garden's yield. These are just a few of the hundreds of cases from every part of the country of increased productivity due to "natural" soil enrichment. They all go to prove that Faulkner's methods basically are applicable to any soil problem in any soil area.

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Paul Weatherwax, PLANT BIOLOGY (W. B. Saunders Company, Philadelphia, Pa.)

The author presents the fundamental principles of plant life in simple, easily understandable language.

Paul B. Sears, DESERTS ON THE MARCH, (University of Oklahoma Press, Norman, Oklahoma, 1947. $2.75)

The author is a botanist of broad culture and deep understanding who clearly appreciates the extent and terrible consequences of bad agricultural practices. This book should be widely read so that the horizons of our people may be broadened sufficiently to prevent the erosions of soils and men.

Sarabeth Leslie, SIMPLE LIFE AT MORNINGSIDE, (The Exposition Press, One Spruce Street, New York 7, New York. $2.00)

This book tells a charming story of life in the country.

Charles H. Mueller, BULBS FOR BEAUTY, (M. Barrows & Company, Inc., 114 East 32nd Street, New York 16, New York. $3.50)

The author explains in an interesting manner the bulbous plants of the garden from earliest spring until late in fall. Included is a portfolio of blooming spring and summer flowers which is a pleasant deviation from the common run of garden books.

David B. Greenberg, COUNTRYMAN'S COMPANION, Harper and Brothers Publishers, New York, New York. $3.00)

This is an anthology of beautiful farm literature in which each article seems to vie with every other one for first place. Reading the book is like traveling through a countryside in which each new view impresses one as the most beautiful of all. In addition to beauty, the book contains the wisdom of the ages and agricultural practices of the past to which we should return, at least in principle.

Kendal and Julia Morton, FIFTY TROPICAL FRUITS OF NASSAU (Textbook House, Inc., Coral Gables 34, Florida, U. S. A. $3.50).

This book acquaints its readers with the origin, history, and economic importance of

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ORGANIC GARDENING Emmaus, Penna.

WIRE WORMS

Q. Can you give us any assistance in the effective control of wire worms?

Mrs. J. W. S., Manteca, Calif.

A. Wire worms are very difficut to handle. Their life cycle varies from one to six years. Fall plowing or fall spading helps to kill these worms as well as the adult beetles before they emerge from the soil. In the vegetable garden, one can often effect some remedy by planting a row of corn here and there. The wire worms attack the corn and allow all other vegetables in the garden to go free. By enriching the soil with humus the other organisms of the soil will bring the wire worms under control.

—o—

WEBWORMS

Q. What are webworms? They are about to take southwest Missouri by force. They seem to prefer some trees to others. My apple trees are almost completely defoliated, while the peach trees remain untouched.

G. R. C., Carthage, Missouri.

A. Webworm is a general name for a variety of widely distributed caterpillars which feed under the protection of silken webs. The fall webworm feeds on the leaves of many kinds of trees. The garden webworm prefers clover, alfalfa, and other crop plants. The caterpillars grow to maturity in the webs, and pupate under trash on the ground or under pieces of loose bark of trees. The best control method consists in the practice of sanitation. Remove all webs from infested plants and incorporate them in the interior of the compost heap where the high temperature will kill them. Thoroughly clean all debris and

trash from the garden to prevent these pests spending the winter in your garden.

—o—

ELECTROCULTURE

Q. What is meant by electroculture? Does this method of culture injure earth worms, especially the capsules and young worms?

E. R., Lynwood, Calif.

A. Electroculture refers to the growing of plants and animals in direct contact with the soil and with reference to the lines of force that extend, through the atmosphere and through the earth, from the north to the south pole. The earth is a great magnet. Dr. George Shaw White and others believe that plants, for example, that are grown in pots in a greenhouse are much more luxuriant if the soil in which they are planted is connected by copper wire or other conductor to the earth, so that they are "grounded." Applied to earthworm culture, it means that the boxes in which the earthworms are grown are similarly grounded.

—o—

COMPOST FOR FLOWERS

Q. Could I use pure compost for my dahlias and gladioluses, or should it be mixed with soil and in what proportions?

J. K., Orlando, Florida.

A. Compost is an extremely valuable fertilizer in that it has all the required plant nutrients in near perfect balance. Use it much the same way you would use any other valuable fertilizer. Give each plant one or more handfuls of compost and work it into the soil gently. Unlike other fertilizers, compost will not injure plants regardless of how much you use. For potted plants, use 4 parts of

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good garden soil to one part of compost. If the soil is heavy, loosen it by adding some sand.

—o—

COMPOSTING CITRUS ORCHARDS

Q. Do citrus trees respond favorably to the use of compost?

D. C., Phoenix, Arizona.

A. Citrus trees grow satisfactorily in any well-drained soil, although they succeed best in a medium loam which is rich in humus. An increasing number of growers are using organic fertilizers exclusively, particularly compost, to fertilize their citrus orchards. Citrus trees are mycorrhizal feeders and respond so well to organic fertilizers that growers no longer need to use the poisonous sprays and dusts to control diseases and insect pests. It is important to maintain a high level of organic matter in the soil. Cover crops disked into the soil in such way that the feeder roots are not injured is a good practice.

—o—

CONTROL OF BLACKBERRY SUCKERS

Q. Will you please advise me how to control the suckers (branches that come up from the roots) in my blackberry patch?

I. Y., Middlebush, N. J.

A. The suckers on blackberry bushes can be controlled largely by proper cultivation. Remove all suckers not wanted before they reach a foot in height. Pull them out rather than cut them off with a hoe or scythe, as a profusion of new stems will arise from each stump. The formation of suckers is favored by the cutting of the roots when cultivating the parent plants. It is important, therefore, to cultivate carefully and not deeply. As a matter of fact, a deep mulch between the rows to prevent the growth of weeds and to conserve the moisture of the soil is a much better practice than cultivation.

NUT GRASS

Q. Can you direct me to someone who can tell me something about nut grass, what it likes and what it dislikes in the soil? I am mostly interested in knowing what it dislikes.

K. I. C., Bay City, Texas.

A. Nut grass is really a sedge. Its scientific name is *Cyperus rotundus L.* It is a perennial and propagates itself by producing scaly tuber-bearing rootstocks. The stem is rather stout, the leaves from 2 to 3 inches wide, and the flowers are borne in a compound or nearly single umbel. Like all sedges, it prefers wet soil. What is dislikes most is a well-drained dry soil. It can be controlled by proper drainage and by the removal as well as possible of the rootstocks.

—o—

CUTTINGS OF FLOWERING SHRUBS

Q. How does one make cuttings from such flowering shrubs as rose of sharon, vibrunum, and mock orange?

J. B., East Quoque, L. I., N. Y.

A. Cuttings of flowering shrubs can be made anytime after August when the new growth has become somewhat hard. A cutting should include from 4 to 5 buds, and in putting them in sand to root two buds should be beneath the surface. Root formation can be stimulated by using Rootone or other root-forming hormone.

—o—

SHREDDING PLANT MATERIALS

Q. What is the advantage of grinding or shredding plant materials before putting them in the compost heap?

A. J. R., La Mesa, Calif.

A. The grinding or shredding of plant materials to be composted is a good practice because it hastens the composting process. The finer the materials are, the more surface they will expose to the soil organisms in the compost heap, whose activities convert plant and animal residues into compost.

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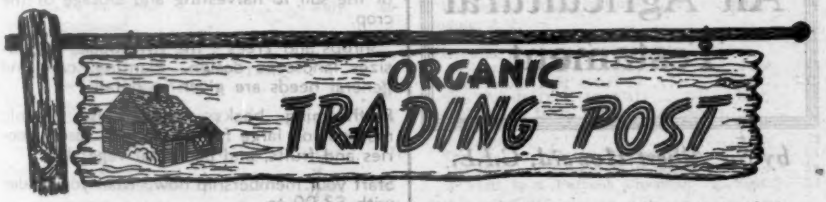

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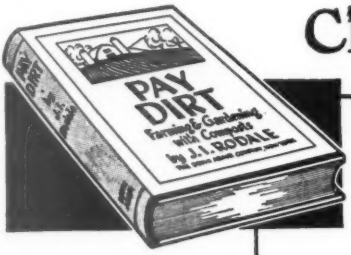

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